SIEMENS

ACUSON X150™ Ultrasound System

DICOM Conformance Statement

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CONFORMANCE STATEMENT OVERVIEW

The **ACUSON X150™ Ultrasound System** supports the following DICOM Application Entities:

- Verification
  - Verification AE
- Transfer
  - Storage AE
  - Storage Commitment AE
- Workflow Management
  - Worklist AE
  - MPPS AE
- Print Management
  - Print AE

Table 1: Network Services

SOP Classes	Service Class User (SCU)	Service Class Provider (SCP)
VERIFICATION		
Verification AE		
Verification	Yes	Yes
TRANSFER		
Storage AE		
Ultrasound Image Storage (Retired)	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Comprehensive SR	Yes	Yes
Storage Commitment AE		
Storage Commitment Push Model	Yes	No
WORKFLOW MANAGEMENT		
Worklist AE		
Modality Worklist	Yes	No
MPPS AE		
Modality Performed Procedure Step	Yes	No
PRINT MANAGEMENT		
Print AE		
Basic Grayscale Print Management Meta SOP Class	Yes	No
Basic Color Print Management Meta SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Color Image Box SOP Class	Yes	No
Print Job SOP Class	Yes	No

Table 2: UID Values

SOP Class Name	SOP Class UID	Category
Verification AE		
Verification	1.2.840.10008.1.1	Verification
Storage AE		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Transfer
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Transfer
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Transfer
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Transfer
Storage Commitment AE		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Transfer
Worklist AE		
Modality Worklist	1.2.840.10008.5.1.4.31	Workflow Management
MPPS AE		
Modality Performed Procedure Step	1.2.840.10008. 3.1.2.3.3	Workflow Management
Print AE		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Print Management
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Print Management
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Print Management
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Print Management
Print Job SOP Class	1.2.840.10008.5.1.1.14	Print Management

The ISO Images generated by the X150 may be used to realize real DICOM Profiles (See DICOM PS3.11). These Profiles shall be described in Chapter 5. The supported Profiles are listed in the table below.

Table 3: Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
DVD—Recordable		
STD-US-ID-SF-DVD	Yes	Yes
STD-US-SC-SF-DVD	Yes	No
Compact Disk—Recordable		
STD-US-ID-SF-CDR	Yes	Yes
STD-US-SC-SF-CDR	Yes	No

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1.0 Purpose

This document describes the conformance to the ACR-NEMA DICOM 3.0 Standard by the ACUSON X150 Ultrasound System, software version 2.0, from Siemens Healthcare. It shall establish the conformance specifications for this system only, and does not apply to other products offered by Siemens Healthcare, or its affiliates.

The ACUSON X150 is a device that generates ultrasound images that can be sent using DICOM standard protocols and definitions to other DICOM compliant devices that support SOP classes as defined in Table 5 in this document.

1.1 Scope

The DICOM standard provides a well-defined set of structures and protocols that allow inter-operability to a wide variety of medical imaging devices.

When configured with the DICOM option, the ACUSON X150 systems provide support for essential services related to ultrasound scanning and connectivity to DICOM compliant devices. ACUSON X150 system products will not support all features supported by the DICOM standard. This document clearly states the DICOM services and data classes that are supported by the applications included with the ACUSON X150. The intent of this document is to allow users and other vendors who also conform to the DICOM standard to exchange information within the specific context of those elements of the DICOM standard that ACUSON X150 system supports.

This document is written with respect to the adopted portions of the DICOM standard, Revision 3. The following sections of this document follow the outline specified in the DICOM Standard NEMA publication PS3.2.[1]

2.0 Definitions

The following table provides a list of terms, their acronyms (if applicable), and their descriptions.

Table 4: Terms, Acronyms, and Descriptions

Term	Acronym	Description
American College of Radiology - National Electrical Manufacturer's Association	ACR-NEMA	The American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA) formed a joint committee to develop a standard for Digital Imaging and Communications in Medicine (DICOM).
Application Entity	AE	An application that supports DICOM communication with other DICOM applications.
DICOM Conformance Statement	DCS	A formal statement associated with a specific implementation of the DICOM Standard. It specifies the Service Classes, Information Objects, Communications Protocols and Media Storage Application Profiles supported by the implementation.
DICOM Message Service Element	DIMSE	Defines an Application Service Element (both the service and protocol) used by peer DICOM Application Entities for the purpose of exchanging medical images and related information.
Digital Imaging and Communications in Medicine, Version 3.0	DICOM 3.0	A well-defined set of structures and protocols that allow inter-operability to a wide variety of medical imaging devices.

[1] Source: DICOM® Standards Publication Part 2, © NEMA. The DICOM Standard is under continuous maintenance. The current official version is available at http://dicom.nema.org.

Term	Acronym	Description
Ethernet	-	Network methodology devised in 1976 by Digital Equipment Corporation, Intel and Xerox which is the most common in practice today. Ethernet is the IEEE standard 802.3
Information Object Definition	IOD	A data abstraction of a class of similar Real-World Objects which defines the nature and attributes relevant to the class of Real-World objects represented.
Integrating the Healthcare Enterprise	IHE	An initiative sponsored by the Radiological Society of North America (RSNA) to document and demonstrate standards-based methods of sharing information in support of optimal patient care. For additional information see www.rsna.org/ihe.
Picture Archiving and Communications Systems	PACS	A DICOM server that accepts medical images from another DICOM system and stores the images for later retrieval.
Protocol Data Unit	PDU	The PDUs are message formats exchanged between peer entities within a layer. A PDU shall consist of protocol control information and user data.
Real-World Activity	RWA	That which exists in the real world which pertains to specific area of information processing within the area of interest of the DICOM Standard. Such a Real-World Activity may be represented by one or more computer information metaphors called SOP Classes.
Request	RQ	A request from one DICOM AE for service from another DICOM AE
Response	RSP	A response from one DICOM AE to the request for service from another DICOM AE
Service Class Provider	SCP	The role played by a DICOM Application Entity (DIMSE-Service-User) which performs operations and invokes notifications on a specific Association.
Service Class User	SCU	The role played by a DICOM Application Entity (DIMSE-Service-User) which invokes notifications and performs operations on a specific Association.
Service-Object Pairs	SOP	The union of a specific set of DIMSE Services and one related Information Object Definition which completely defines a precise context for communication.
Structured Report	SR	Also called Procedure Report. A DICOM object which contains measurement, calculations, diagnoses, image references and other information concerning a patient exam.
Unique identifier	UID	A series of digits and periods (.) used to uniquely identify an object such as an Ultrasound image in DICOM.
VA Hospital Information System Technology Architecture DICOM Conformance Requirements	VISTA	DICOM requirements document of the US Department of Veteran's Affairs (VA) Hospital Information System Technology Architecture. For additional information see www.va.gov/imaging.

3.0 Implementation Model

ACUSON X150 system users can store images and other data directly on the ACUSON X150 system hard disk. Images and structured reports can be exported to a DICOM archive server or workstation on a network. In the following sections, ACUSON X150 system Real World Activities are indicated by "Real World Activity" name while "X150 AE" indicates the invoked Application Entity. Similarly, the activities associated with service providers are indicated as "Real World Service Activity."

3.1 Application Dataflow diagram

Figure 1 illustrates the ACUSON X150 system's Application Entity (AE), which is shown in the box. Relationships between user invoked activities (in the circles at the left of the AE) and the associated real-world activities provided by DICOM service providers (in the circles on the right of the diagram) are shown.

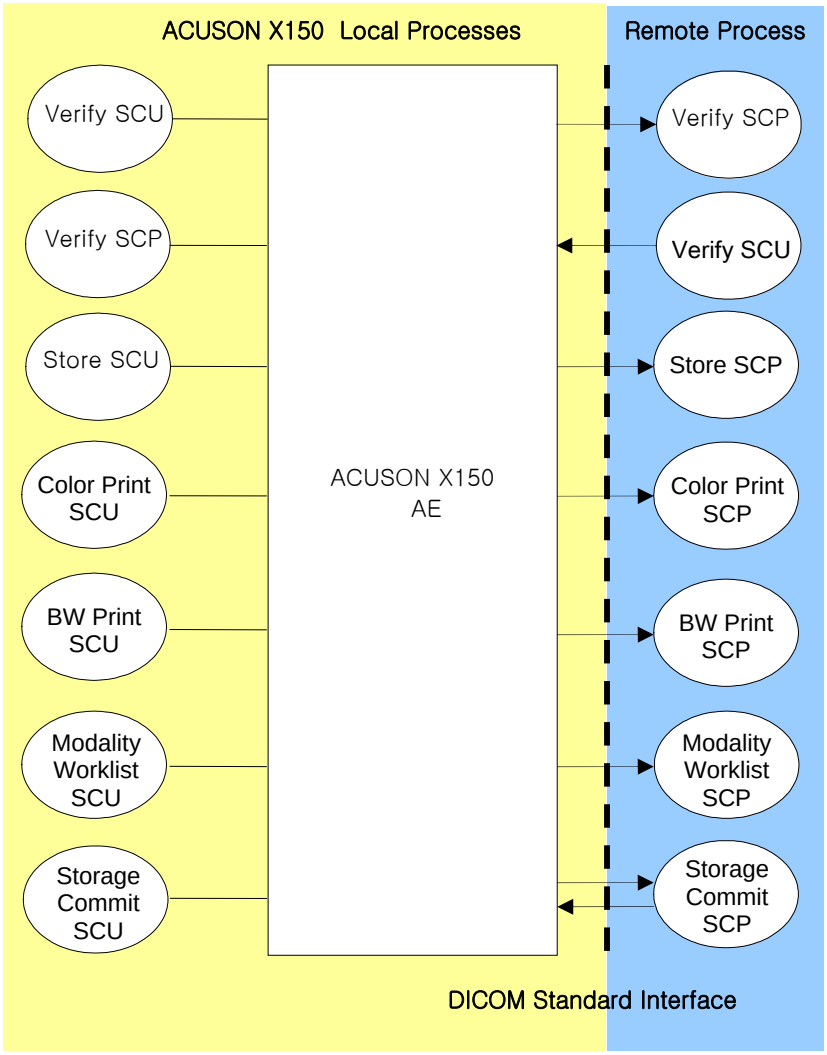


Figure 1. Implementation Model

3.1.1 Verification

Verification is a part of the DICOM configuration located on the 'DICOM' page of the System Presets. Verification can be used to send a DICOM Verification request to a remote Application Entity (AE) and listen for a response.

When used as a diagnostic tool, Verification returns the following messages to the user:

- If the verification succeeds: "DICOM - Successfully contacted system"
- If the verification fails: "DICOM - Unable to communicate with system"

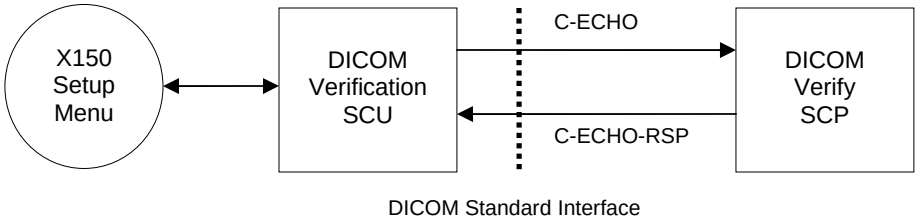


Figure 2. Verification Model

3.1.2 DICOM Store

When requested, the ACUSON X150 sends images and/or structured reports to the preconfigured DICOM Storage server.

DICOM Store can be seen as two sub-operations:

- Queueing images and/or structured reports for transfer.
- Transferring images and/or structured reports to the storage server.

Queuing images and structured reports for transfer:

ACUSON X150 can be configured to automatically queue up images and structured reports for transfer as they are being created. “AutoStore to DICOM” option in DICOM presets has to be set for this.

Alternatively, user can select exams or individual images and manually queue them up from Review mode. When an exam is selected for DICOM store all images and structured reports (generally zero or one) will be queued. Structured reports can’t be selected individually for store, the entire exam must be stored.

Transfer of images and structured reports to the storage server:

Further, once images and/or structured reports are queued they may be immediately transferred or delayed till the end of study using the transfer storage configuration.

ACUSON X150 supports two storage configurations: “Store At End of Exam” and “Store During Exam”.

If the storage configuration is set to “Store At End of Exam”, transfer attempts begin when the user selects “Close Study” or “New Patient”.

If the storage configuration is set to “Store during Exam”, transfer attempts to destination devices begin immediately after they are queued.

For both “Store At End of Exam” and “Store During Exam” settings, image and/or structured report transfer will be delayed if the ACUSON X150 is busy performing another DICOM Store operation.

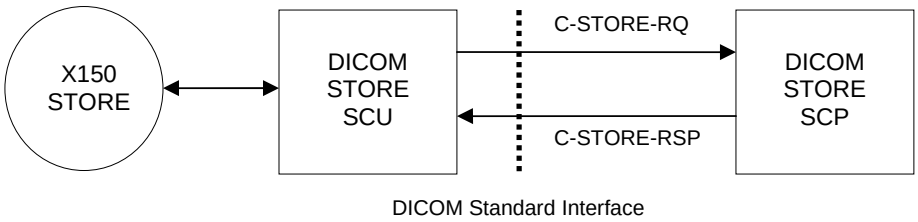


Figure 3. Store Model

3.1.3 DICOM Print

ACUSON X150 system is capable of grayscale (B/W) and color printing.

When requested, single frame images will be printed to a pre-configured DICOM network printer.

DICOM Print can be seen as two sub-operations:

- paging images for transfer
- transferring pages to printer

Paging images for transfer:

ACUSON X150 can be configured to automatically queue up images to be printed on B/W Printer and/or Color printer as they are being created.

Alternatively, user can select exams or individual images and manually queue them up from Review mode for print.

Every image queued up is added into a page in the respective printer layout (DICOM B/W Printer Layout or DICOM Color Printer Layout).

Transfer of pages to the Printer:

Further, pages may be immediately transferred to the printer or delayed until the end of study based on the transfer configuration.

ACUSON X150 supports two configurations: “Print At End of Exam” and “Print When Page Full”.

If the configuration is set to “Print At End of Exam,” transfer attempts of all pages to the destination DICOM printer begin as a batch when the user ends the exam.

If the configuration is set to “Print When Page Full”, transfer attempt of a page to the destination DICOM printer begins as soon as it becomes full.

For both “Print At End of Exam” and “Print When Page Full” settings, page transfer will be delayed if the ACUSON X150 is busy performing another DICOM Print operation.

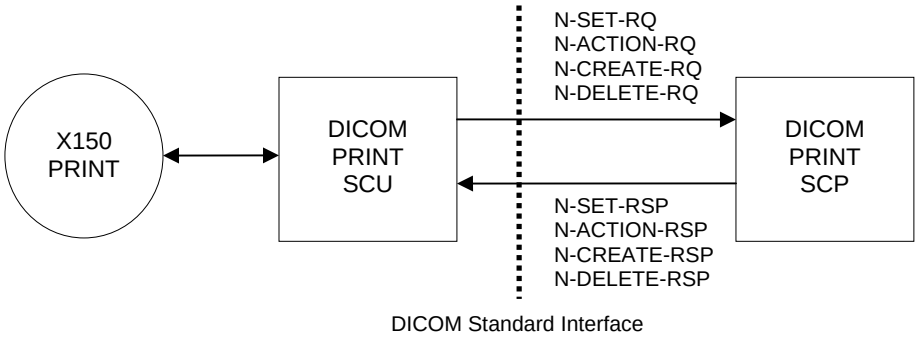


Figure 4. Print Model

3.1.4 Patient Registration using Worklist

Patient registration can be automated by using the 'Worklist' Real World Activity. Pressing the 'New Patient' key on the keyboard initiates the patient data registration process and closes the previous active

study. Pressing the 'Worklist' button on the patient data display screen invokes the Worklist query screen. The Worklist query screen can also be initiated from the Study screen.

Pressing the 'Search' button will attempt to find all matching patient data using the information entered on the Worklist Query screen. Patient name fields that are partially filled or empty will be treated as though an implicit wildcard was appended at the end of each field. Patient ID, Requested Procedure ID and Accession number will be exact match only. If no matches are found, a message will be presented to the operator indicating so. If more that one matching patient is found, a pick list of patient procedures will be presented to the user to select from. Each of the fields will be sortable in ascending and descending order.

The pick list of patient procedures will be limited to a number of preset entries. If more than this number of matching records are found in the query, the search will terminate and the user will be notified. The search list criteria will contain:

- Patient name
- Patient ID
- Accession number
- Exam start date/time range
- Requested Procedure ID
- US/All modalities
- Scheduled station AE title

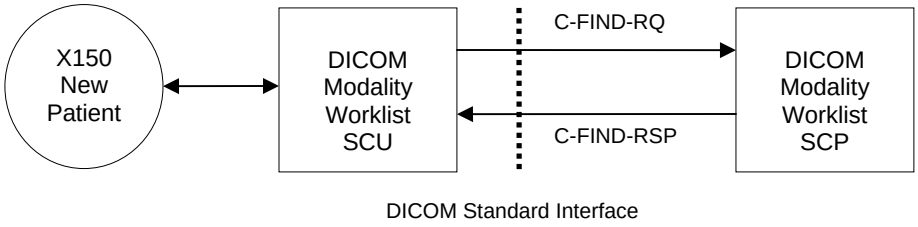


Figure 5. Modality Worklist Model

Once a Worklist query is initiated, a “Retrieving worklist, please wait ...” dialog will be presented to the user. The user will only have one option, “Cancel,” which will abort the query operation.

The following data fields in Modality Worklist Screen are initially populated from the New Patient Screen, if filled in, and can be used for query:

Attribute Name	Tag
Patient’s Full Name	(0010,0010)
Patient ID	(0010,0020)
Accession Number	(0008,0050)

The following data fields will be populated on the worklist screen for each return:

Attribute Name	Tag
Patient's Full Name	(0010,0010)
Patient ID	(0010,0020)
Accession Number	(0008,0050)
Exam Start Date/Time	(0040,0002), (0040,0003)
Scheduled Procedure Step Sequence	(0040,0100)*
>Scheduled Procedure Step Description	(0040,0007)
>Scheduled Protocol Code Sequence	(0040,0008)
>>Code Value	(0008,0100)
Requested Procedure Description	(0032,1060)
Exam Type	(0008,1030)**
*<code1>, …,<codeN>: <sched1>,…,<schedn> where: code<i> = Sequence item code value(0008,0100) for a given sequence or value multiplicity sched<i> = Scheduled procedure step(0040,0007) for a given sequence or value multiplicity	
**if a value exists for (0008,1030). Otherwise, Exam Type is set to value of Scheduled Procedure Step (0040,0007). If (0040,0007) is also empty, Exam Type is set to Requested Procedure Description (0032,1060) if it exists.	

The user will have the option to select a patient procedure step, or cancel the operation. Selection of a procedure step from the list will cause demographic information for the patient to be loaded in to the patient data fields.

The following data fields will be populated on the patient data screen:

Attribute Name	Tag
Patient Name (last, first, middle, prefix, suffix)	(0010,0010)
Patient ID	(0010,0020)
Accession number	(0008,0050)
Exam start date/time	(0040,0002), (0040,0003)
DOB	(0010,0030)
Sex	(0010,0040)
Weight	(0010,1030)
Height	(0010,1020)
Physician	(0008,0090)
Indication	(0080,1080)
LMP	(0010,21D0)

3.1.5 Modality Performed Procedure Step

The ACUSON X150 System supports reporting of Modality Performed Procedure Step (MPPS) orders when the patient registration process utilizes the 'Worklist' Real World Activity. Procedure steps are presented to the operator after successful query of a server that supports the MPPS option. A detail window allows the operator access to individual scheduled procedure steps. Pressing the 'Procedures' push button on the Review Screen actualizes the detail window when multiple procedure steps are listed for the patient.

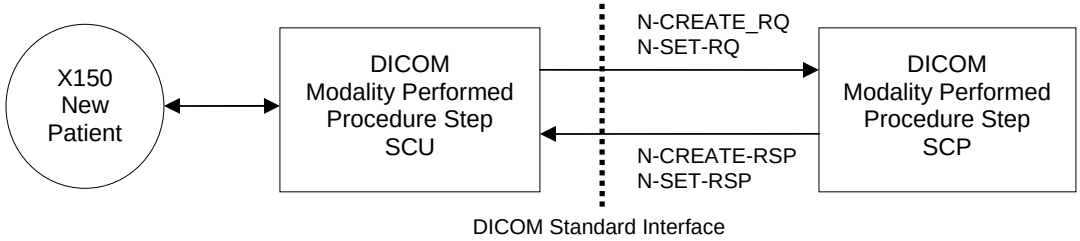


Figure 6. MPPS Model

3.1.6 Removable Media Storage

The ACUSON X150 can perform DICOM operations to its standard on-board 120mm CD/DVD disk drive.

The ACUSON X150 performs the File Set Creator and File Set Reader Roles for CD and DVD disks. The File Set Reader functionality does not support import of DICOM Structured Reports or measurements of imported images. Both limitations are overcome when DICOM and TIFF format is exported to CD/DVD. A DICOM conforming CD/DVD media is created when the user saves studies in DICOM format to the CD/DVD. A DICOM 3.0 conforming DICOMDIR file is created together with the directory structures, image files and structured reports (if any exist).

3.1.7 Storage Commitment

The user can exercise the Storage Commitment option by configuring and selecting a Storage Commitment server from the DICOM Presets menu. The ACUSON X150 system requests commitment of images and structured reports (if any exist) and upon successful acknowledgment from the Storage server marks the study on the system hard drive as 'Archived'.

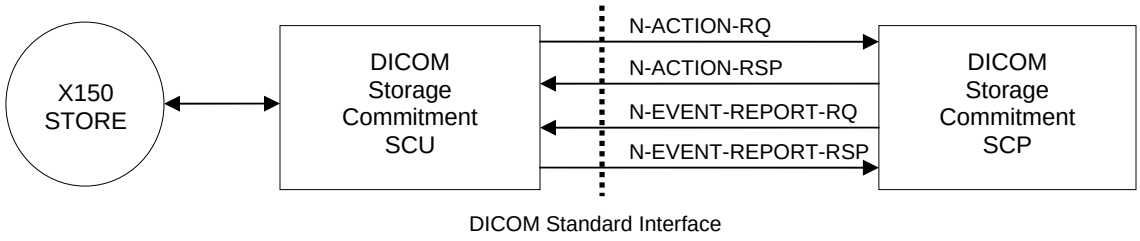


Figure 7. Storage Commitment Model

3.2 AE Functional Definition

3.2.1 Verification Real-World Activities

The ACUSON X150 application entity performs Verification Service Class as an SCU and SCP, allowing the operator to verify the ability of an application on a remote device to receive DICOM messages and allowing the operator of a remote DICOM device to verify the ACUSON X150 system's ability to receive DICOM messages. (C-ECHO DIMSE)

3.2.2 Store Real-World Activities

The ACUSON X150 Application Entity (AE) performs all of the functions to transmit ultrasound images, structured reports and associated data to network servers or workstations. The ACUSON X150 AE supports the Ultrasound Image, Ultrasound Image (Retired), and Secondary Capture storage SOP classes as an SCU.

The ACUSON X150 AE also supports Structured Reports, for Obstetric studies only, using the Comprehensive SR SOP Class as an SCU.

The ACUSON X150 AE initiates an association for C-STORE Requests to store providers when the user invokes "DICOM Store". The association may be used to store multiple images and structured reports and is closed when no images or structured reports are available to be stored to the remote device for five seconds.

3.2.3 Storage Commitment - Push Model Real-World Activities

The ACUSON X150 AE supports Storage Commitment Push Model SOP class to inform servers when all the store operations for a study have been completed. The Storage Commitment SCU uses the N-ACTION primitive to request safekeeping of a set of SOP Instances. The Storage Commitment SCU also processes the N-EVENT-REPORT primitives that are received from the SCP indicating 'successful' or 'non-successful' commitment status. The N-EVENT-REPORT information is used to mark a study as being successfully archived to a DICOM SCP.

The successful commit status and archival indication on the X150 does not ensure permanent archival of the images and Structured Reports. The operations performed by the SCP are dependent on its capabilities and configuration.

3.2.4 Print Real-World Activities

The ACUSON X150 AE provides all aspects of the Print Management SCU. The ACUSON X150 AE initiates an association to the printer when the user invokes "DICOM Print". The association may be used to print multiple pages and is closed when no pages are available to be printed to the remote device for five seconds.

3.2.5 Modality Worklist Real-World Activities

The ACUSON X150 AE supports the DICOM Basic Worklist Management Service as an SCU. The AE initiates an association to the active Worklist server when a Worklist query is selected (via the "Worklist" button). The association is closed upon the completion of each query. A preset maximum number of matching results is accepted, at which point, the ACUSON X150 AE issues a C-CANCEL-RQ request.

3.2.6 Modality Performed Procedure Step Real-World Activities

The ACUSON X150 AE supports Modality Performed Procedure Step (MPPS) in the role of SCU. The ACUSON X150 is capable of displaying scheduled procedure steps via the User Interface (UI) for Modality Performed Procedure Step. The operator can select a single PPS. The operator can notify the MPPS server that a MPPS is 'In Progress', 'Discontinued' or 'Completed'.

3.2.7 Removable Media Storage Real-World Activities

The ACUSON X150 AE provides a standard implementation of DICOM Store to CD or DVD. The ACUSON X150 AE selects one or more studies and exports the same to CD or DVD. ACUSON X150 AE creates a DICOM File Format Image File for every image and structured report in each of the selected studies.

A DICOMDIR file is created along with the files.

Measurements are not supported on imported images unless TIFF format is exported.

The DICOM SR cannot be imported from media unless the TIFF format is exported along with the DICOM SR.

3.2.8 Sequencing of Real-World Activities

Print, Store, Echo, Worklist, Storage Commit and MPPS commands can be transmitted simultaneously within the limits described below.

Storage Commit

The Storage Commitment command (if enabled) is sent in the following situations:

a. On series close, when all images have previously stored successfully.

b. The series is closed before all images are stored successfully, all previous stores have succeeded and the last image stores successfully.

c. The series is closed before all images are stored successfully, at least one store has succeeded, at least one store has failed and the last store with non-zero retry count fails or succeeds.

d. A series has been partially committed as in c. Later, due to "Retry Job" button press on the Store Status UI screen, the store jobs are retried. Another Storage Commit is sent when at least one store has succeeded and the last store with non-zero retry count fails or succeeds.

MPPS

The MPPS command (if enabled) is sent in the following situations:

a. N-CREATE command is sent whenever a new procedure step is selected. The state of the MPPS command is set to “In-Progress”.

b. N-SET command is sent when the Procedure Step is closed by the user pressing either the Completed or Discontinued button on the Close Procedure dialog. The state of the MPPS command is set, according to the state (Completed or Discontinued) set by the user.

4.0 AE Specifications

The following specifications apply to the ACUSON X150 AE as depicted in Figure 1.

4.1 ACUSON X150 AE Specification

The ACUSON X150 AE provides conformance to the following DICOM Service SOP Classes as an SCU.

Table 5: Supported SOP Classes

Service SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1

Service SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Storage Commitment - Push Model	1.2.840.10008.1.20.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16
Modality Worklist Information Model C- FIND	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33

4.2 Association Establishment Policies

4.2.1 General

The ACUSON X150 system utilizes TCP/IP. The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU offered for an association initiated by ACUSON X150 is:

- Maximum PDU Offered: 28672

4.2.2 Association Establishment Order

ACUSON X150 initiates each C-Store Request one at a time, one for each transfer request being processed.

Image format on ACUSON X150 can be set to one of “Automatic”, “Old Ultrasound”, or “Secondary Capture”.

For the “Automatic” setting, ACUSON X150 proposes Ultrasound Image, Secondary Capture Image, and Comprehensive SR sequentially.

For the “Old Ultrasound” setting, ACUSON X150 proposes Ultrasound Image (Retired), Secondary Capture, and Comprehensive SR Image to be negotiated sequentially.

For the “Secondary Capture” setting, ACUSON X150 proposes Secondary Capture Image and Comprehensive SR to be negotiated sequentially.

4.2.3 Asynchronous Nature

All associations use the default synchronous mode of operation. Asynchronous Operations Window negotiations are not supported on the ACUSON X150 system.

4.2.4 Implementation Identifying Information

- Implementation Class UID: “1.3.12.2.1107.5.5.5” (See below).
- Implementation Version Name: “MergeCOM3_351”

Siemens has provided registration for all Siemens Medical Solutions Groups. This unique Class UID is defined as:

"1.3.12.2.1107.5.5.product"

Where the interpretation is:

1. = International Standards Organization (ISO)

3. = International branch of ISO

12.2.1107.5. = Assigned to Siemens-UB MED

5. = Ultrasound Modality (SMS-UG)

Product = 5 - DICOM implementation for SONOLINE G20, G50, G60S, ACUSON X150 and CV70

4.3 Association Initiation by Real-World Activities

4.3.1 Real World Activity – Verification

The ACUSON X150 is capable of supporting Verification service class as SCU or SCP. Verification can be initiated as a singular event from the Systems Presets menu to any configured SCP that supports Verification.

Proposed Presentation Contexts – Verification

The ACUSON X150 will propose Presentation contexts as shown in Table 6.

Table 6: Verification Presentation Context.

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU/SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU/SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU/SCP	None

4.3.2 Real World Activity – Store

ACUSON X150 facilitates users to store images and structured reports as they are being created or later in review mode.

Queuing images during acquisition

"Autostore to DICOM" option in DICOM presets has to be set. One or more of "Print/Store 1" and "Print/Store 2" keys on the control panel can be configured for Store (Disk Store, D.Store). When the user presses one of the configured keys, an image or clip is acquired, stored on the hard disk and queued up to be transferred to the storage server. Structured reports, if any, will be stored automatically after the study is closed and each time the report is modified after study close.

Queueing images and structured reports in Review mode

User can select one or more closed studies and queue them up for Storage. The DICOM Store button is available in Review screen for this operation. All images and structured reports (if any) are stored. The study must be closed to generate a structured report.

Transfer of images to the storage server

See section 3.1.2

Associated Real World Activities

When images and/or structured reports are transferred from the hard disk to a DICOM Store SCP, the system establishes an association between the ACUSON X150 AE and the configured DICOM device. The association may be used to store multiple images and/or structured reports and is closed when no images or structured reports are available to be stored to the remote device for five seconds.

Proposed Presentation Context

The following Presentation Contexts are presented to the SCP in an A-ASSOCIATE-RQ for DIMSE C-STORE storage services. The storage services utilize C-STORE services, as defined by the DICOM Standard. Table 7 represents all “Store” presentation contexts.

Table 7: Store Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

The ACUSON X150 always acts as an SCU for store and is the client in a client-server model.

SOP Specific Conformance to Storage Service SOP Classes

The Store Real World Activity provides standard extended conformance as an SCU for the following standard Storage Service Class SOP:

Table 8: Supported SOP Classes

Service SOP Class Name	SOP Class UID	Conformance Level
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Standard Extended
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Standard Extended
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Standard Extended
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Standard Extended

This is accomplished using the DIMSE C-STORE Service. The SCU issues a service request with a SOP instance that meets the requirements of the desired ultrasound, secondary capture, or structured report IOD.

The only Structured Report Template supported by the ACUSON X150 is TID 5000 “OB-GYN Ultrasound Procedure Report”.

The following table denotes the attributes included in the Ultrasound Image Object as implemented on the ACUSON X150. Attributes not listed are not used.

Table 9: Ultrasound Image and Ultrasound Retired Image IOD Attributes

Module	Attribute	Tag	Notes
Patient Identification	Patient's Name	(0010,0010)	X150 Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	X150 Patient Data Screen – ID field. Default is today’s date & time (e.g., 03_04_2003_17_54_43 = Apr. 3, 2003 at 5:54:43 PM). Populated from Modality Worklist if used.
Patient Demographic	Patient's Birth Date	(0010,0030)	X150 Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	X150 Patient Data Screen – Gender field. M = male F = female. O = Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient’s Age	(0010,1010)	Calculated from Patient Data Screen DOB field.
	Patient’s Size	(0010,1020)	X150 Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient’s Weight	(0010,1030)	X150 Patient Data Screen – Weight field. Populated from Modality Worklist if used.
	Other Patient IDs	(0010,1000)	Populated from Worklist
Patient Study	Admitting Diagnosis Description	(0008,1080)	X150 Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	Populated from Modality Worklist if used; generated by X150 otherwise
	Study Date	(0008,0020)	Date the exam started.
	Study Time	(0008,0030)	Time the exam started.
	Referring Physician's Name	(0008,0090)	X150 Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	Generated by X150

Module	Attribute	Tag	Notes
	Accession Number	(0008,0050)	X150 Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	Populated with the first attribute from Modality Worklist in this list that contains a valid value: Scheduled Procedure Step Description (0040,0007), Requested Procedure Description (0032,1060), Study Description (0008,1030), Exam Type (“Cardiac”, “OB”, …).
General Series	Modality	(0008,0060)	Always set to “US”
	Series Instance UID	(0020,000E)	Generated by X150
	Series Number	(0020,0011)	Series Number in study (1-n).
	Laterality	(0020,0060)	Always sent as 0 length attribute
	[(b)]Series Date	(0008,0021)	Date the series started.
	[(b)]Series Time	(0008,0031)	Time the series started.
	[(b)]Series Description	(0008,103E)	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.
	[(b)]Protocol Name	(0018,1030)	The exam type of the most recent image stored in a particular series. If no images are stored for a series then the value is set to “Ultrasound”.
	[(b)]Request Attributes Sequence	(0040,0275)	Populated with Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(b)]Scheduled Procedure Step Description	(0040,0007)	Populated with Scheduled Procedure Step Description (0040, 0007) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(b)]Scheduled Protocol Code Sequence	(0040,0008)	Populated with Scheduled Protocol Code Sequence (0040, 0008) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(b)]Scheduled Procedure Step ID	(0040,0009)	Populated with Scheduled Procedure Step ID (0040, 0009) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	>[(b)]Requested Procedure ID	(0040,1001)	Populated with Requested Procedure ID (0040, 1001) from Scheduled Procedure Step Sequence (0040, 0100) if provided by Modality Worklist.
	[(b)]Performed Procedure Step Start Date	(0040,0244)	Date the Performed Procedure Step was started.
	[(b)]Performed Procedure Step Start Time	(0040,0245)	Time the Performed Procedure Step was started.
	[(b)]Performed Procedure Step ID	(0040,0253)	Populated with Scheduled Procedure Step ID (0040, 0009) if provided by Modality Worklist.

Module	Attribute	Tag	Notes
	[(b)]Performed Procedure Step Description	(0040,0254)	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	[(b)]Performed Procedure Protocol Code Sequence	(0040,0260)	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.
	[(b)]Comments on the Performed Procedure Step	(0040,0280)	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.
General Equipment	Manufacturer	(0008,0070)	Set to “SIEMENS”
	Institution Name	(0008,0080)	X150 System Presets – Organization Name field.
	Software Versions	(0018,1020)	Set to the DICOM Software Version
	Manufacturer’s Model Name	(0008,1090)	Set to “X150”
General Image	Instance Number	(0020,0013)	Image number in study (1 – n)
	Patient Orientation	(0020,0020)	Always sent as 0 length attribute
Image Pixel	Samples per Pixel	(0028,0002)	Set to 3 for RGB images.
	Photometric Interpretation	(0028,0004)	Set to “RGB“
	Planar Configuration	(0028,0006)	Color-by-pixel. Set to 0 for RGB images.
	Rows	(0028,0010)	Set to 480 for NTSC; 547 for PAL. For post-processed images and screen captures, this value may be up to 600.
	Columns	(0028,0011)	Set to 640 for NTSC; 692 for PAL. For post-processed images and screen captures, this value may be up to 800.
	Bits Allocated	(0028,0100)	Set to 8.
	Bits Stored	(0028,0101)	Set to 8.
	High Bit	(0028,0102)	Set to 7.
	Pixel Representation	(0028,0103)	Set to 0.
	Pixel Data	(7FE0, 0010)	
US Image	Image Type	(0008,0008)	Always sent as a 0 length attribute.
	Heart Rate	(0018,1088)	Only provided if heart rate is > 0
	Lossy Image Compression	(0028,2110)	“00”
SOP Common	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.6.1 or 1.2.840.10008.5.1.4.1.1.6
	SOP Instance UID	(0008,0018)	Generated by X150
	Specific Character Set	(0008,0005)	Always set to “ISO_IR 100”
Image Plane	Pixel Spacing	(0028,0030)	Pixel Spacing information is only provided for single, full screen, 2D image types (2D image types are B-mode, B-mode with color, B-mode with power).

Module	Attribute	Tag	Notes
Region Calibration	(c)Sequence of Ultrasound Regions	(0018,6011)	
	>(c)Region Spatial Format	(0018,6012)	B-Mode (Tissue or Color) = 0001H M-Mode (Tissue or Color) = 0002H Spectral (CW/PW) Doppler = 0003H
	>(c)Region Data Type	(0018,6014)	B-Mode, M-Mode = 0001H (Tissue) Spectral Doppler = 0004H (CW Spectral Doppler) Spectral Doppler = 0003H (PW Spectral Doppler)
	>(c)Region Flags	(0018,6016)	1st Bit (LSB) = 1 (All images acquired are transparent) 2nd Bit = 1 (All images acquired are automatically scaled) 3rd Bit = 1 for frequency scale 3rd Bit = 0 for velocity scale. The value of the 3rd bit is undefined for any mode other than Doppler. The value for 3rd bit is undefined if both frequency and velocity scales are selected on the Doppler image. 4th Bit is Reserved and value is always 0.
	>(c)Region Location Min X0	(0018,6018)	
	>(c)Region Location Min Y0	(0018,601A)	
	>(c)Region Location Max X1	(0018,601C)	
	>(c)Region Location Max Y1	(0018,601E)	
	>(c)Physical Units X direction	(0018,6024)	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0004H (seconds) Spectral (CW/PW) Doppler = 0004H (seconds)
	>(c)Physical Units Y direction	(0018,6026)	B-Mode (Tissue or Color) = 0003H (cm) M-Mode (Tissue or Color) = 0003H (cm) Spectral (CW/PW) Doppler = 0007H (cm/sec)
	>(c)Physical Delta X	(0018,602C)	
	>(c)Physical Delta Y	(0018,602E)	
	>(c)Reference Pixel X0	(0018,6020)	Attribute only set for Spectral Doppler Regions
	>(c)Reference Pixel Y0	(0018,6022)	Attribute only set for Spectral Doppler Regions
	>(c)Reference Pixel Physical Value X	(0018,6028)	Attribute only set for Spectral Doppler Regions When provided, value is always 0.
	>(c)Reference Pixel Physical Value Y	(0018,602A)	Attribute only set for Spectral Doppler Regions When provided, value is always 0.

Module	Attribute	Tag	Notes
Private Attributes	[(a)]Private Creator	(0011,0010)	Reserves tags (0011,1000) through (0011,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0011,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0011,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0011,1020)	For internal X150 use only.
	[(a)]Private Data	(0011,1021)	For internal X150 use only.
	[(a)]Private Creator	(0013,0010)	Reserves tags (0013,1000) through (0013,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0013,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0013,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0013,1020)	For internal X150 use only.
	[(a)]Private Creator	(0015,0010)	This group is populated only if data is available. Reserves tags (0015, 1000) through (0015,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0015,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0015,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0015,1020)	For internal X150 use only.
	[(a)]Private Creator	(0017,0010)	This group is populated only if data is available. Reserves tags (0017, 1000) through (0017,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0017,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0017,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0017,1020)	For internal X150 use only.
	Private Creator	(0019,0010)	Reserves tags (0019,1000) through (0019,10FF) for use as private tags.
	Import Structured Reports	(0019,1020)	Set to “O” if Obstetric SR options was purchased and SR generation was configured. Otherwise set to “No”. Instructs SCP that it should attempt to import Obstetric measurements from SR.

[(a)] The Attribute is only provided if the image is written to media.

[(b)] The Attribute is only provided if the procedure step is queried from the MWL server.

[(c)] Region Calibration is provided only for 2D (B-Mode), M-Mode, and Spectral Doppler Regions. Region Calibration is not supported on Ultrasound RETIRED images, Screen Captures, and post-processed images. Region Calibration is not supported for M-Mode or Spectral Doppler still images taken from Live Imaging.

Table 10: Secondary Capture Image IOD Attributes

Module	Attribute	Tag	Notes
Patient Identification	Patient's Name	(0010,0010)	X150 Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	X150 Patient Data Screen – ID field. Default is today's date & time (e.g., 03_04_2003_17_54_43 = Apr. 3, 2003 at 5:54:43 PM). Populated from Modality Worklist if used.
Patient Demographic	Patient's Birth Date	(0010,0030)	X150 Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	X150 Patient Data Screen – Gender field. M = male F = female. O= Other Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Age	(0010,1010)	Calculated from Patient Data Screen DOB field.
	Patient's Size	(0010,1020)	X150 Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	X150 Patient Data Screen – Weight field. Populated from Modality Worklist if used.
Patient Study	Admitting Diagnosis Description	(0008,1080)	X150 Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	Populated from Modality Worklist if used; generated by X150 otherwise.
	Study Date	(0008,0020)	Date the exam started.
	Study Time	(0008,0030)	Time the exam started.
	Referring Physician's Name	(0008,0090)	X150 Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	Generated by X150
	Accession Number	(0008,0050)	X150 Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	Populated with the first attribute from Modality Worklist in this list that contains a valid value: Scheduled Procedure Step Description (0040,0007), Requested Procedure Description (0032,1060), Study Description (0008,1030), Exam Type ("Cardiac", "OB", …).

Module	Attribute	Tag	Notes
General Series	Modality	(0008,0060)	Always set to “US”
	Series Instance UID	(0020,000E)	Generated by X150
	Series Number	(0020,0011)	Series Number in study (1-n).
	Laterality	(0020,0060)	Always sent as 0 length attribute.
	(b)Series Date	(0008,0021)	Date the series started.
	(b)Series Time	(0008,0031)	Time the series started.
	(b)Series Description	(0008,103E)	Populated with Scheduled Procedure Step Description if a value was provided by Modality Worklist.
	(b)Protocol Name	(0018,1030)	The exam type of the most recent image stored in a particular series. If no images are stored for a series then the value is set to “Ultrasound”.
	(b)Request Attributes Sequence	(0040,0275)	Populated with Scheduled Procedure Step Sequence (0040,0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step Description	(0040,0007)	Populated with Scheduled Procedure Step Description (0040,0007) from Scheduled Procedure Step Sequence (0040,0100) if provided by Modality Worklist.
	>(b)Scheduled Protocol Code Sequence	(0040,0008)	Populated with Scheduled Protocol Code Sequence (0040,0008) from Scheduled Procedure Step Sequence (0040,0100) if provided by Modality Worklist.
	>(b)Scheduled Procedure Step ID	(0040,0009)	Populated with Scheduled Procedure Step ID (0040,0009) from Scheduled Procedure Step Sequence (0040,0100) if provided by Modality Worklist.
	>(b)Requested Procedure ID	(0040,1001)	Populated with Requested Procedure ID (0040,1001) from Scheduled Procedure Step Sequence (0040,0100) if provided by Modality Worklist.
	(b)Performed Procedure Step Start Date	(0040,0244)	Date the Performed Procedure Step was started.
	(b)Performed Procedure Step Start Time	(0040,0245)	Time the Performed Procedure Step was started.
	(b)Performed Procedure Step ID	(0040,0253)	Populated with Scheduled Procedure Step ID (0040,0009) if provided by Modality Worklist.
	(b)Performed Procedure Step Description	(0040,0254)	Populated with Scheduled Procedure Step Description (0040,0007) if provided by Modality Worklist.
	(b)Performed Procedure Protocol Code Sequence	(0040,0260)	Populated with Scheduled Protocol Code Sequence (0040,0008) if provided by Modality Worklist.
	(b)Comments on the Performed Procedure Step	(0040,0280)	Populated with Comments on the Scheduled Procedure Step (0040,0400) if provided by Modality Worklist.

Module	Attribute	Tag	Notes
SC Equipment Module	Conversion Type	(0008,0064)	Set to “WSD”
General Equipment	Manufacturer	(0008,0070)	Set to “SIEMENS”
	Institution Name	(0008,0080)	X150 System Presets – Organization Name field.
	Software Versions	(0018,1020)	Set to the DICOM Software Version
	Manufacturer’s Model Name	(0008,1090)	Set to “X150”.
General Image	Instance Number	(0020,0013)	Image number in study (1 – n)
	Patient Orientation	(0020,0020)	Always sent as 0 length attribute.
Image Pixel	Samples per Pixel	(0028,0002)	Set to 3 for RGB images.
	Photometric Interpretation	(0028,0004)	“RGB”
	Planar Configuration	(0028,0006)	Color-by-pixel. Set to 0 for RGB images.
	Rows	(0028,0010)	Set to 480.
	Columns	(0028,0011)	Set to 640.
	Bits Allocated	(0028,0100)	Set to 8.
	Bits Stored	(0028,0101)	Set to 8.
	High Bit	(0028,0102)	Set to 7.
	Pixel Representation	(0028,0103)	Set to 0.
	Pixel Data	(7FE0,0010)	
SOP Common	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
	SOP Instance UID	(0008,0018)	Generated by X150
	Specific Character Set	(0008,0005)	Always set to “ISO_IR 100”
Private Attributes	[(a)]Private Creator	(0011,0010)	Reserves tags (0011,1000) through (0011,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0011,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0011,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0011,1020)	For internal X150 use only.
	[(a)]Private Data	(0011,1021)	For internal X150 use only.
	[(a)]Private Creator	(0013,0010)	Reserves tags (0013,1000) through (0013,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0013,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0013,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0013,1020)	For internal X150 use only.
	[(a)]Private Creator	(0015,0010)	This group is populated only if data is available. Reserves tags (0015,1000) through (0015,10FF) for use as private tags.

Module	Attribute	Tag	Notes
	[(a)]Siemens Medical Solutions Model Name	(0015,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0015,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0015,1020)	For internal X150 use only.
	[(a)]Private Creator	(0017,0010)	This group is populated only if data is available. Reserves tags (0017,1000) through (0017,10FF) for use as private tags.
	[(a)]Siemens Medical Solutions Model Name	(0017,1010)	Always set to “X150”.
	[(a)]DIMAQ Software Version	(0017,1011)	Set to version of DIMAQ software installed.
	[(a)]Private Data	(0017,1020)	For internal X150 use only.
	Private Creator	(0019,0010)	Reserves tags (0019,1000) through (0019,10FF) for use as private tags.
	Import Structured Reports	(0019,1020)	Set to “O” if Obstetric SR options was purchased and SR generation was configured. Otherwise set to “No”. Instructs SCP that it should attempt to import Obstetric measurements from SR.

[(a)] The Attribute is only provided if the image is written to media.

[(b)] The Attribute is only provided if the procedure step is queried from the MWL server.

The following table denotes the attributes included in the Comprehensive SR Object as implemented on the ACUSON X150. Attributes not listed are not used.

Table 11: Comprehensive SR IOD Attributes

Module	Attribute	Tag	Notes
Patient	Patient's Name	(0010,0010)	X150 Patient Data Screen – Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	X150 Patient Data Screen – ID field. Default is today’s date & time (e.g., 03_04_2003_17_54_43 = Apr. 3, 2003 at 5:54:43 PM). Populated from Modality Worklist if used.
	Patient's Birth Date	(0010,0030)	X150 Patient Data Screen – DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	X150 Patient Data Screen – Gender field. M = male F = female. O = Other Default is a zero length attribute. Populated from Modality Worklist if used.

Module	Attribute	Tag	Notes
	Patient's Size	(0010,1020)	X150 Patient Data Screen – Height field. Populated from Modality Worklist if used.
	Patient's Weight	(0010,1030)	X150 Patient Data Screen – Weight field. Populated from Modality Worklist if used.
Patient Study	Admitting Diagnosis Description	(0008,1080)	X150 Patient Data Screen – Indication field. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	Populated from Modality Worklist if used; generated by X150 otherwise
	Study Date	(0008,0020)	Date the exam started.
	Study Time	(0008,0030)	Time the exam started.
	Referring Physician's Name	(0008,0090)	X150 Patient Data Screen – Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	Generated by X150
	Accession Number	(0008,0050)	X150 Patient Data Screen – Accession # field. Populated from Modality Worklist if used.
	Study Description	(0008,1030)	Populated with the first attribute from Modality Worklist in this list that contains a valid value: Scheduled Procedure Step Description (0040,0007), Requested Procedure Description (0032,1060), Study Description (0008,1030), Exam Type ("Cardiac", "OB", …).
SR Document Series	Modality	(0008,0060)	Always set to "SR"
	Series Instance UID	(0020,000E)	Generated by X150
	Series Number	(0020,0011)	Series Number in study (2-n).
	Series Date	(0008,0021)	Date the series started.
	Series Time	(0008,0031)	Time the series started.
	Referenced Performed Procedure Step Sequence	(0008,1111)	Populated with MPPS SOP Class UID and MPPS SOP instance UID of MPPS command sent for the procedure step(s) performed.
General Equipment	Manufacturer	(0008,0070)	Set to "SIEMENS"
	Institution Name	(0008,0080)	X150 System Presets – Organization Name field.
	Software Versions	(0018,1020)	Set to the DICOM Software Version
	Manufacturer's Model Name	(0008,1090)	Set to "X150"
SR Document General	Content Date	(0008,0023)	Date the report was created
	Content Time	(0008,0033)	Time the report was created
	Instance Number	(0020,0013)	Always set to 0.
	Completion Flag	(0040,A491)	Always set to "PARTIAL"

Module	Attribute	Tag	Notes
	Verification Flag	(0040,A493)	Always set to “UNVERIFIED”
	Predecessor Documents Sequence	(0040,A360)	Supplied if a previous SR was generated for the study. Populated with SOP Class UID and SOP Instance UID of the previous Obstetric SRs for the study, if any. See table C17-2 in PS 3.3-2004 for sequence definition.
	Performed Procedure Code Sequence	(0040,A372)	Populated with contents of Procedure Code Sequence from Modality Worklist if available, empty otherwise. See table C17-2 in PS 3.3-2004 for sequence definition.
	Current Requested Procedure Evidence Sequence	(0040,A375)	Lists all images in the study. See table C17-2 in PS 3.3-2004 for sequence definition.
SOP Common	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.88.33
	SOP Instance UID	(0008,0018)	Generated by X150.
	Specific Character Set	(0008,0005)	Always set to “ISO_IR 100.
	Instance Creation Date	(0008,0012)	Date the SOP Instance was created.
	Instance Creation Time	(0008,0013)	Time the SOP Instance was created.
	Instance Creator UID	(0008,0014)	
Private Attributes	Private Creator	(0019,0010)	Reserves tags (0019,1000) through (0019,10FF) for use as private tags.
	Import Structured Reports	(0019,1020)	Set to “O” if Obstetric SR options was purchased and SR generation was configured. Otherwise set to “No”. Instructs SCP that it should attempt to import Obstetric measurements from SR.

Error Handling

The following table indicates the response status codes that are handled by the ACUSON X150 AE, which a SCP may return following the SCU’s C-STORE-RSP command.

A successful C-STORE operation will allow the ACUSON X150 AE to continue to the next action desired by the user.

Table 12: C-STORE Status Responses

Service Status	Further Meaning	Protocol Codes	Related Fields
Refused	Out of resources.	A7xx	None
Error	Data set does not match SOP Class. Cannot understand.	A9xx Cxxx	None
Warning	Coercion of data Elements. Data set does not match SOP Class. Elements discarded.	B000 B007 B006	None
Success		0000	None

If the C-STORE operation is not successful, the image(s) and Structured Report(s), if any, are spooled on the ACUSON X150 hard drive. A user-configured number of additional attempts are made to store the image(s) and Structured Report(s). If these attempts fail, the user must select the job and press “Retry Job” on the Store Status page to complete the C-STORE operation.

All image and Structured Report storage on the 150 system hard drive is temporary in nature. If an attempt is made to store images on a full ACUSON X150 system hard drive, the system will attempt to delete studies archived to CD or DICOM. If no deleteable data exists, a “DISK FULL” message is displayed on the ACUSON X150 system display. The user must then delete studies not archived in order to store additional images.

4.3.3 Real World Activity - Print

ACUSON X150 facilitates user to print images as they are being created or later in review mode.

Paging images during acquisition

One or more of “Print/Store 1” and “Print/Store 2” keys on the control panel can be configured for Print (DICOM B/W Print and/or DICOM Color Print). When the user presses one of the configured keys on the control panel, the image is acquired, stored on the hard disk and placed in a page under the respective printer layout (DICOM B/W Printer Layout or DICOM Color Printer Layout).

Paging images in Review mode

User can select either individual images from open or closed studies, or one or more closed studies and queue them up for print. DICOM B/W Printer and DICOM Color Printer buttons are available in Review screen for this operation. When a study is selected for print, all single-frame images belonging to the study will be printed.

Transfer of pages to the Printer

Pages may be immediately transferred or delayed till the end of study using the transfer configuration.

ACUSON X150 supports two configurations: “Print At End of Exam” and “Print When Page Is Full”.

If the configuration is set to “Print At End of Exam”, all pages queued to destination devices will be transferred as a batch when the user selects “Close Study” or “New Patient”.

If the configuration is set to “Print When Page Is Full”, a page is transferred to destination devices immediately after it is full.

For both “Print At End of Exam”, and “Print When Page Is Full” settings, image transfer will be delayed if the ACUSON X150 is busy performing another DICOM Command (Store/Print/Echo).

Associated Real World Activities

An association is established when the user initiates a “B/W Print” or “Color Print” operation from the Review screen. Individual images or entire exams can be transferred to the selected DICOM Print device. The association is closed no pages are available to be printed for five seconds. An association may also be opened after a network outage or when the system is powered-on if images are queued to be printed.

Proposed Presentation Context to a Grayscale Print Server

Table 13: Grayscale Print Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The ACUSON X150 AE provides standard conformance of the Grayscale Meta SOP classes as an SCU. Specifically, with respect to the Basic Grayscale Print Management Meta SOP Class this means conformance to the underlying SOP classes:

Table 14: Conformance to Grayscale Print Meta SOP Class

SOP Class Name	SOP Class UID	Conformance Level
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Standard
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Standard
Printer SOP Class	1.2.840.10008.5.1.1.16	Standard

All mandatory elements of these classes are supported.

Specific Conformance to Basic Film Session SOP Class

DICOM specified usage - M = Mandatory; U = User Option

Table 15: Supported DIMSE Services for Basic Film Session SOP Class

Name	Usage	Description
N-Create	M	Creates the Film Session.
N-Set	U	Not used.
N-Delete	U	Deletes the Film Session.
N-Action	U	Not used.

SOP Specific Conformance to Basic Film Box SOP Class

Table 16: Supported DIMSE Services for Basic Film Box SOP Class

Name	Usage	Description
N-Create	M	Creates the Film Box.
N-Set	U	Not used.
N-Delete	U	Deletes the Film Box. Issued after each film is printed.
N-Action	M	PRINT. Sent after each Film Box is filled, and at the end of the exam to force a print of partially filled Film Box.

Table 17: Attributes set for the Basic Film Box SOP Class

Attribute Name	Attribute Tag	Usage	Range	Description
Image Display Format	(2010,0010)	M	STANDARD\ X,Y	Where X, Y can be configured/ selected as 1*1, 1*2, 2*2, 2*3, 3*2, 3*3, 3*5, 4*5, 4*6, 5*6
Film Orientation	(2010,0040)	U	PORTRAIT LANDSCAPE	Range may be limited by print server/printer.
Film Size ID	(2010,0050)	U	8INX10IN 8.5INX11IN 10INX12IN 10INX14IN 11INX14IN 11INX17IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM A3 A4	Range may be limited by print server/printer.
Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Min. Density	(2010,0120)	U	0-65535	Printer specific
Max Density	(2010,0130)	U	0-65535	Printer specific
Configuration Information	(2010,0150)	U		Printer specific
Smoothing Type	(2010,0080)	U		Printer specific
Border Density	(2010,0100)	U	BLACK WHITE	
Empty Image Density	(2010,0110)	U	BLACK WHITE	
Trim	(2010,0140)	U	YES NO	

SOP Specific Conformance to Basic Grayscale Image Box SOP Class

Table 18: Supported DIMSE Services for the Basic Grayscale Image Box SOP

Name	Usage	Description
N-Set	M	The SCP for each potential image of the film box creates an image box instance. Only those instances, which actually contain images, will be updated with the N-SET message.

Table 19: Attributes set for the Basic Grayscale Image Box SOP Class

Name	Attribute	Range	Description
Image Position	(2020,0010)	1-30	Value according to Image Display Format
Polarity	(2020,0020)	NORMAL, REVERSE	Intensity mapping between display and print

Table 20: Supported DIMSE Services for the Printer SOP

Name	Usage	Description
N-Event-Report	M	Ignored and not handled.
N-Get	U	May be issued by this device at any time to get printer status.

Table 21: Supported Printer SOP Class Elements

Name	Usage	Range	Description
Printer Status	U	WARNING FAILURE	During a “Failure” the Print job will be displayed as “Failed”
Printer Status Information	U	Vendor specific	Reported to user if printer status = WARNING or FAILURE.

Proposed Presentation Context to a Color Print Server

Table 22: Color Print Server Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The ACUSON X150 Print AE provides standard conformance to the color printing Meta SOP classes as an SCU. Specifically, with respect to the Basic Color Print Management Meta SOP Class this means conformance to the underlying SOP classes:

Table 23: Conformance to Color Print Meta SOP Class

SOP Class Name	SOP Class UID	Conformance Level
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Standard
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Standard
Printer SOP Class	1.2.840.10008.5.1.1.16	Standard

SOP Specific Conformance to Basic Color Image Box SOP Class

The Basic Color Print Management Meta SOP Class makes identical use of the *Basic Film Session SOP Class, Basic Film Box SOP Class* and *Printer SOP Class* elements, which have been previously described for grayscale image printing. Therefore, these will not be described again in this section on color printing. However, it should be noted that certain attributes, such as Medium Type which is defined in the Basic Film Session SOP Class, are highly likely to require printer/print server specific media.

Table 24: Supported DIMSE Services for the Basic Color Image Box SOP Class

Name	Usage	Description
N-Set	M	The SCP for each potential image of the film box creates an image box instance. Only those instances, which actually contain images, will be updated with the N-SET message.

Table 25: Attributes set for the Basic Color Image Box SOP Class

Name	Attribute	Range	Description
Planar Configuration	(0028,0006)	Color-by-plane	Red plane, Green plane, Blue plane.

The Printer SOP Class behavior is identical to that used for grayscale printing.

Error Handling

The ACUSON X150 Print AE supports the following error codes and reports failures to the user.

Table 26: Supported Error Codes for Printer Classes

Service Status	Further Meaning	Protocol Codes
Success	Film accepted for Printing	0000
Warning	Film accepted for Printing, one or more settings ignored.	107, 116, B600, B605
Failure	Printing not successful	C602, C603, C613

If the print operation is not successful, the image(s) are spooled on the ACUSON X150 hard drive. A user-configured number of additional attempts are made to print the image(s). If these attempts fail, the user must select the job and press “Retry Job” on the Print Status page to complete the print operation.

4.3.4 Real World Activity – Modality Worklist

A separate Network association is established by the AE for each Worklist query operation, with only one active query at a time. The association is closed at completion of the query.

Table 27: Worklist Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The ACUSON X150 will always act as an SCU and as the client in a client-server model.

SOP Specific Conformance to Modality Worklist Service SOP Classes

The Worklist AE provides conformance to the following DICOM Service SOP Classes as an SCU all at a standard extended level of conformance:

Table 28: Worklist Supported SOP Classes

Supported SOP Class Name	SOP Class UID	Conformance Level
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Standard Extended

The following table provides the list of attributes requested in the Modality Worklist Query.

Table 29: Modality Worklist Information Model Attributes

Attribute Name	Tag
Specific Character Set	(0008,0005)
Accession number	(0008,0050)*
Referring Physician’s Name	(0008,0090)
Study Description	(0008,1030)
Admitting Diagnoses Description	(0008,1030)
Referenced Study Sequence	(0008,1110)
>Referenced SOP Class UID	(0008,1150)
>Referenced SOP Instance UID	(0008,1155)
Patient’s Name	(0010,0010)*
Patient ID	(0010,0020)*
Patient’s Birth Date	(0010,0030)
Patient’s Sex	(0010,0040)
Patient’s Size	(0010,1020)
Patient’s Weight	(0010,1030)
Medical Alerts	(0010,2000)

Attribute Name	Tag
Contrast Allergies	(0010,2110)
Pregnancy Status	(0010,21C0)
Last Menstrual Date	(0010,21D0)
Patient Comments	(0010,4000)
Study Instance UID	(0020,000D)
Requesting Physician	(0032,1032)
Requested Procedure Description	(0032,1060)
Requested Procedure Code Sequence	(0040,0008)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Coding Scheme Version	(0008,0103)
>Code Meaning	(0008,0104)
Special Needs	(0038,0050)
Patient State	(0038,0500)
Scheduled Procedure Step Sequence	(0040,0100)
>Modality	(0008,0060)
>Scheduled Station AE Title	(0040,0001)*
>Scheduled Procedure Step Start Date	(0040,0002)
>Scheduled Procedure Step Start Time	(0040,0003)
>Scheduled Performing Physician's Name	(0040,0006)
>Scheduled Procedure Step Description	(0040,0007)
>Scheduled Protocol Code Sequence	(0040,0008)
>>Code Value	(0008,0100)
>>Coding Scheme Designator	(0008,0102)
>>Coding Scheme Version	(0008,0103)
>>Code Meaning	(0008,0104)
>Scheduled Procedure Step ID	(0040,0009)
>Comments on the Scheduled Procedure Step	(0040,0400)
Requested Procedure ID	(0040,1001)*
Reason for the Requested Procedure	(0040,1002)

*Indicates parameter may be populated for query.

4.3.5 Real World Activity - Modality Performed Procedure Step

This operation allows the AE to create an instance of the Modality Performed Procedure Step SOP Class (MPPS) and provide information about a specific real world Performed Procedure Step that is under control of the SCU. This operation is invoked through the DIMSE N-CREATE and N-SET services.

Only the IHE (refer to IHE Rev 5.5) Simple and Abandoned Cases for the relationship between Scheduled Procedure Steps and Performed Procedure Steps is supported. Both cases specify that a 1-to-1 relationship must exist between Scheduled Procedure Step and Performed Procedure Step. In the

Simple Case, the Performed Procedure Step is complete successfully. In the Abandoned Case, the Performed Procedure Step is abandoned before being completed.

A list of scheduled procedures and procedure steps will be accessible from the Worklist and Procedure screens. The Performed Procedure Step User Interface allows the operator to set the status of the performed procedure step. The system shall establish an association for N-CREATE and N-SET; if another N-CREATE or N-SET is available within 5 seconds, it will be sent using the same association.

Starting a Performed Procedure Step

When the user depresses the 'OK' button on the New Patient Screen a performed procedure SOP Class instance will be created using the N-CREATE DIMSE service for the selected scheduled procedure.

Ending a Performed Procedure Step

When the user selects 'Completed' or 'Discontinued' from the MPPS User Interface, the performed procedure step will be closed using the N-SET DIMSE service.

New Patient Request

If the 'New Patient' button is selected and there are opened performed procedure steps, the user shall be prompted for a closure status for the opened procedure step by the MPPS User Interface. Any opened procedure steps must be closed before any 'new patient' data can be entered.

System Shutdown

If the user requests 'System Shutdown' and there is an open performed procedure step, the user will be prompted for a closure status for the open procedure step. All procedure steps should be closed before the system can be shutdown. Failure to close a procedure step will result in the procedure step being set to Discontinued.

Error Handling

If the MPPS operation is not successful, the MPPS command is spooled on the ACUSON X150 hard drive. A user-configured number of additional attempts are made to complete the MPPS Commands. If these attempts fail, the user must select this job and press "Retry Job" on the Store Status page to complete the MPPS operation.

Proposed Presentation Context

Table 30: MPPS Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The ACUSON X150 system will always act as an SCU and be the client in a client – server model.

SOP Specific Conformance to Modality Performed Procedure Step SOP Classes

The Modality Performed Procedure Step AE provides a conforming implementation of the following DICOM Service SOP Class as an SCU at a standard extended level of conformance.

Table 31: Supported SOP Class

Supported SOP Class Name	SOP Class UID	Conformance Level
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Standard Extended

The following tables provide the list of attributes supported by the AE in the implementation of MPPS SOP Class including N-CREATE, N-SET and Final State attributes. The ACUSON X150 sends N-SET only at final state.

Table 32: Modality Performed Procedure Step Attributes in N-CREATE

Attribute	Tag	Notes
Specific Character Set	(0008,0005)	Always set to “ISO_IR 100”
Scheduled Step Attribute Sequence	(0040,0270)	
>Study Instance UID	(0020,000D)	Value obtained from Modality WorkList; generated by X150 in some cases
>Referenced Study Sequence	(0008,1110)	Populated with contents of Referenced Study Sequence from Modality Worklist if used, created otherwise. See table F.7.2-1 in PS 3.4-2004 for sequence definition.
>Referenced Patient Sequence	(0008,1120)	Always empty
>Accession Number	(0008,0050)	Value obtained from Modality WorkList
>Requested Procedure ID	(0040,1001)	Value obtained from Modality WorkList
>Requested Procedure Description	(0032,1060)	Value obtained from Modality WorkList
>Scheduled Procedure Step ID	(0040,0009)	Value obtained from Modality WorkList
>Scheduled Procedure Step Description	(0040,0007)	Value obtained from Modality WorkList
>Scheduled Protocol Code Sequence	(0040,0008)	Value obtained from Modality WorkList
>>Code Value	(0008,0100)	Value obtained from Modality WorkList
>>Coding Scheme Designator	(0008,0102)	Value obtained from Modality WorkList
>>Coding Scheme Version	(0008,0103)	Value obtained from Modality WorkList
>>Code Meaning	(0008,0104)	Value obtained from Modality WorkList
Patient’s Name	(0010,0010)	Value obtained from Modality WorkList
Patient ID	(0010,0020)	Value obtained from Modality WorkList
Patient’s Birth Date	(0010,0030)	Value obtained from Modality WorkList
Patient’s Sex	(0010,0040)	Value obtained from Modality WorkList
Performed Procedure Step ID	(0040,0253)	Value obtained from Modality WorkList
Performed Station AE Title	(0040,0241)	The AE title of the X150 on which the procedure was performed.
Performed Station Name	(0040,0242)	
Performed Location	(0040,0243)	
Performed Procedure Step Start Date	(0040,0244)	The start date of the performed procedure step.
Performed Procedure Step Start Time	(0040,0245)	The start time of the performed procedure step.
Performed Procedure Step Status	(0040,0252)	Always set to “In-Progress”.

Attribute	Tag	Notes
Performed Procedure Step Description	(0040,0254)	Value obtained from Modality WorkList
Performed Procedure Type Description	(0040,0255)	Always sent as 0 length attribute
Procedure Code Sequence	(0008,1032)	Populated with contents of Requested Procedure Code Sequence from Modality Worklist if used, empty otherwise. See table F.7.2-1 in PS 3.4-2004 for sequence definition.
Performed Procedure Step End Date	(0040,0250)	Always sent as 0 length attribute
Performed Procedure Step End Time	(0040,0251)	Always sent as 0 length attribute
Modality	(0008,0060)	Always set to US
Study ID	(0020,0010)	Populated from Requested Procedure ID (0040,1001) if Modality Worklist is used; created by X150 otherwise
Performed Protocol Code Sequence	(0040,0260)	Always empty
Performed Series Sequence	(0040,0340)	Always empty

Table 33: Modality Performed Procedure Step Attributes in N-SET

Attribute	Tag	Notes
Performed Procedure Step Status	(0040,0252)	Set to “Discontinued” or “Completed” based on user selection.
Performed Procedure Step End Date	(0040,0250)	Date the procedure step was completed
Performed Procedure Step End Time	(0040,0251)	Time the procedure step was completed
Performed Series Sequence	(0040,0340)	Shall contain only one series
>Performing Physician’s Name	(0008,1050)	
>Protocol Name	(0008,1030)	Exam type specified by the operator.
>Operator’s Name	(0008,1070)	
>Series Instance UID	(0020,000E)	The Instance UID of the series to which the procedure belongs.
>Series Description	(0008,103E)	Always sent as 0 length attribute
>Retrieve AE Title	(0008,0054)	Always sent as 0 length attribute
>Referenced Image Sequence	(0008,1140)	List of all the images in the series.
>>Referenced SOP Class UID	(0008,1150)	The SOP class UID can be one of: Ultrasound Image Storage 1.2.840.10008.5.1.4.1.1.6.1 Ultrasound Image Storage (Retired) 1.2.840.10008.5.1.4.1.1.6 Secondary Capture Image Storage 1.2.840.10008.5.1.4.1.1.7

Attribute	Tag	Notes
>>Referenced SOP Instance UID	(0008,1155)	The SOP instance UID of the image.
> Referenced Non-Image Composite SOP Instance Sequencd	(0040,0220)	Always empty

4.3.6 Real-World Activity - Storage Commitment

This operation allows the AE to create an instance of the Storage Commitment SOP Class and to provide information about a specific Real World Activity that is under the control of the SCU. The AE invokes a request for safekeeping of images by the N-ACTION REQUEST. Referenced in the N-ACTION Request are the SOP class UID(s) and SOP instance UID(s) for all STORE Class objects requesting commitment by the SCU.

Storage Commit

The Storage Commitment (if enabled) command is sent in the following situations:

a. On series close, when all images and Structured Reports have previously stored successfully.

b. The series was previously closed, all previous stores have succeeded and the last image or Structured Report stores successfully.

c. The series was previously closed, at least one store has succeeded, at least one store has failed and the last store with non-zero retry count fails or succeeds.

d. A series has been partially committed as in c. Later, due to "Retry Job" button press on the Store Status UI screen the store jobs are retried. Another Storage Commit is sent when at least one store has succeeded and the last store with non-zero retry count fails or succeeds.

The ACUSON X150 waits for the return of a successful N-ACTION RESPONSE Status Code applicable for the associated request indicating whether the commitment request was successful or a failure. The ACUSON X150 waits for the N-EVENT REPORT from the SCP for at most 48 hours. TheACUSON X150 is capable of accepting the N-EVENT REPORT on the association it initiates for the N-ACTION or one initiated by the SCP. Studies with all SOP instances marked as ‘successful’ in the N-EVENT REPORT will be eligible for deletion from the system hard drive.

The ACUSON X150 allows the user to configure a Storage Commitment Server which may be different from the Storage Server. Thus, the Storage Commitment SCP must wait for an appropriate time for the stored images to arrive from the Storage server.

Image-By-Image and Batch Storage Commitment are supported as specified in “Vista DICOM Conformance Requirements for Image Modalities in Radiology, Cardiology, Dental, Ophthalmology and other specialities” (Version 2.3).

Storage Commitment of Structured Reports is supported.

Proposed Presentation Context

Table 34: Storage Commitment Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The ACUSON X150 system will act as an SCU in the ‘Push Model” Storage Commitment SOP Class.

SOP Specific Conformance to Storage Commitment SOP Class

The Storage Commitment AE provides conformance to the following DICOM Service SOP Class as an SCU at a standard level of conformance.

Table 35: Supported SOP Class

Supported SOP Class Name	SOP Class UID	Conformance Level
Storage Commitment Push Model	1.2.840.10008.1.20.1	Standard

Storage Commitment to Storage Media (CD) is not supported.

The following table provides the list of attributes supported by the AE in the implementation of Storage Commitment SOP Class:

Table 36: Storage Commitment Request Attributes in N-ACTION REQUEST

Attribute	Tag	Notes
Transaction UID	(0008,1195)	Generated by X150
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

Error Handling

If the storage commitment operation is not successful, a user-configured number of additional attempts are made. If these attempts fail, the user must select the job and press “Retry Job” on the DICOM Store Queue page to complete the storage commitment operation.

5.0 Removable Media Interchange Specifications

This implementation supports 120mm CD and DVD medium.

5.1 Supported Application Profiles

ACUSON X150 provides standard conformance to the following Ultrasound Application Profiles. A DICOM 3.0 conformant DICOMDIR file is created together with the directory structures and image files.

Table 37: Application Profiles, Real-World Activities, and Roles

Supported AP	Real-World Activity	Roles	SC Option
STD-US-ID-SF-CDR	Create CD-R	FSC, FSR	Interchange
STD-US-SC-SF-CDR	Create CD-R	FSC	Interchange
STD-US-ID-SF-DVD	Create DVD	FSC, FSR	Interchange
STD-US-SC-SF-DVD	Create DVD	FSC	Interchange

5.2 Supported SOP Classes

5.2.1 Supported SOP Classes and Transfer Syntaxes

This implementation provides standard conformance to the following DICOM 3.0 SOP Classes.

Table 38: Transfer Syntaxes for Media Interchange

Service SOP Class Name	SOP Class UID	Transfer Syntax Name	Transfer Syntax UID List
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1

5.3 Information Object Definition and DICOMDIR Keys

5.3.1 DICOM File Meta Information

The following table denotes the attributes included in the Ultrasound Image Object as implemented on the ACUSON X150 in addition to the attributes listed in Table 9.

Table 39: US Image Attributes Used

Attribute Name	Tag	Notes
File Preamble	No Tag or Length fields	All bytes are set to 00H
DICOM Prefix	No Tag or Length fields	Set to DICOM Prefix “DICM”
Group length	(0002,0000)	
File Meta Information Version	(0002,0001)	Always set to 0001H
Media Storage SOP Class UID	(0002,0002)	Always Ultrasound Image 1.2.840.10008.5.1.4.1.1.6.1
Media Storage SOP Instance UID	(0002,0003)	
Transfer Syntax UID	(0002,0010)	Always Explicit VR Little Endian 1.2.840.10008.1.2.1
Implementation Class UID	(0002,0012)	Always set to 1.3.12.2.1107.5.5.5
Implementation Version Name	(0002,0013)	Always set to MergeCOM3_351

The following table denotes the attributes included in the Comprehensive SR Object as implemented on the ACUSON X150 in addition to the attributes listed in Table 11.

Table 40: Comprehensive SR Attributes Used

Attribute	Tag	Notes
File Preamble	No Tag or Length fields	All bytes are set to 0
DICOM Prefix	No Tag or Length fields	Set to “DICM”
Group length	(0002,0000)	
File Meta Information Version	(0002,0001)	Always set to 0001H
Media Storage SOP Class UID	(0002,0002)	Always Comprehensive SR 1.2.840.10008.5.1.4.1.1.88.33
Media Storage SOP Instance UID	(0002,0003)	
Transfer Syntax UID	(0002,0010)	Always Explicit VR Little Endian 1.2.840.10008.1.2.1
Implementation Class UID	(0002,0012)	Always set to 1.3.12.2.1107.5.5.5
Implementation Version Name	(0002,0013)	Always set to MergeCOM3_351

5.3.2 Basic Directory Information Object Definitions - File-set Identification Module

Attribute	Tag	Notes
File-Set ID	(0004,1130)	Set to serial number + YYMMDD + 3 digit counter. Volume Label has this same value.

5.3.3 Basic Directory Information Object Definitions - Directory Identification Module

Attribute	Tag	Notes
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	
Offset of the Last Directory Record of the Root Directory Entry	(0004,1202)	
File-set Consistency Flag	(0004,1212)	
Directory Record Sequence	(0004,1220)	
>Offset of the Next Directory Record	(0004,1400)	
>Record In-use Flag	(0004,1410)	
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	
>Directory Record Type	(0004,1430)	
>Referenced File ID	(0004,1500)	
>Referenced SOP Class UID in File	(0004,1510)	
>Referenced SOP Instance UID in File	(0004,1511)	

5.3.4 Physical Storage Media and Media Formats

The physical storage media supported are 120mm CD-R, CD-RW, DVD-R, DVD+R, DVD-RW, and DVD+RW medium.

6.0 Communication Profiles

All ACUSON X150 system application entities utilize the DICOM 3.0 TCP/IP communication support as defined in PS3.8 (Part 8) of the DICOM 3.0 Standard.

6.1 TCP/IP Stack Supported

Each process inherits its TCP/IP stack from the ACUSON X150's operating systems TCP/IP stack. The local AE Port number is always set to 104.

6.2 Physical Media Supported

Standard representations of IEEE 802.3 10BaseT/100BaseT ("twisted pair") is supported.

6.3 Chapter Extensions/Specializations/Privatizations

Pixel Spacing information is only provided for single, full screen, and 2D image types (B-mode, B-mode with color, and B-mode with power).

Appendix A lists the DICOM SR mappings used by the ACUSON X150 AE in Obstetric Structured Reports. All private concept names use the Coding Scheme Designator “99SIEMENS”.

7.0 Configuration

ACUSON X150 Networking and DICOM parameters can be configured through the ACUSON X150 System Presets Menu screens. The following configuration is supported:

- General system
- Network (local and remote)
- DICOM Store
- DICOM Print
- DICOM Modality Worklist
- DICOM Storage Commitment
- DICOM Modality Performed Procedure Step

7.1 General System Configuration

The following system parameter can be configured via the ACUSON X150 System Presets Basic Menu screens. This parameter is mapped to a DICOM image attribute:

- Hospital Name

7.1.1 Hospital Name

The user can enter the organization (i.e. hospital, clinic, etc.) as a text string in the Hospital Name field of the System Presets - General menu. The Organization Name field is transferred to DICOM devices as Institution Name - DICOM data element (0008, 0080).

7.2 DICOM Network Configuration

DICOM and networking parameters can be configured for both the local ACUSON X150 device and remote DICOM service class providers through the System Presets DICOM Menu.

7.2.1 Local

The ACUSON X150 local network parameters are configurable. The following network parameters can be configured for an ACUSON X150 device:

- Host Name
- IP address
- Subnet IP mask
- Default Gateway
- DICOM Application Entity Title

7.2.2 Remote

Multiple DICOM service class providers can be configured through the system presets. The following network parameters can be configured for each remote device:

- DICOM Device Application Entity Title
- IP address
- Port Number

7.2.2.1 DICOM Store Configuration

Several configuration settings are provided in addition to those described in Section 7.2.2.

The Image Format setting provides control over the Presentation Contexts proposed during Association negotiation. This is documented in Section 4.2.2.

7.2.2.2 DICOM Storage Commitment Configuration

Configuration of DICOM Storage Commitment remote devices must be performed separately from DICOM Store Configuration. The ACUSON X150 supports Storage Commitment to the same remote device as Store or to a different device.

7.2.2.3 DICOM Modality Worklist Configuration

Configuration of DICOM Modality Worklist remote devices is enabled in X150.

7.2.2.4 DICOM Modality Performed Procedure Step Configuration

Configuration of DICOM Modality Performed Procedure Step remote devices must be performed separately from DICOM Modality Worklist Configuration. The ACUSON X150 supports MPPS to the same remote device as Modality Worklist or to a different device.

The “Store Image Format” setting controls the Referenced SOP Class UID (0008,1150) in the Referenced Image Sequence (0008,1140) of the MPPS N-SET sent by the ACUSON X150. Due to the ACUSON X150’s ability to select from multiple Presentation Contexts during Association Negotiation, it is necessary to use this setting.

In the majority of installations, the “Store Image Format” should be left at the default setting of “New Ultrasound”. There are two cases when the “Store Image Format” must be set to “Old Ultrasound” or “Secondary Capture”:

- When the active Storage Server “Image Format” is set to “Old Ultrasound” or “Secondary Capture”.
- When the active Storage Server “Image Format” is set to “Automatic”, but the Storage Server does not support US Image.

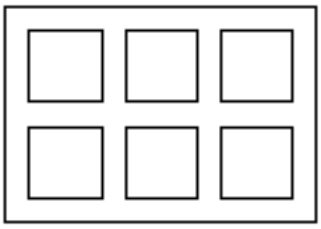
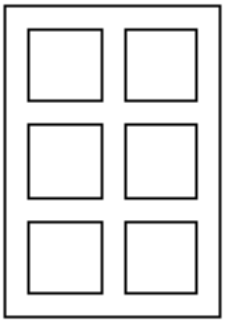
In both cases, the correct setting can be determined by reviewing the DICOM Conformance Statement of the Storage Server and following the instructions below. DICOM Conformance Statements are usually available on the manufacturer’s Web site.

- If at least one US Image is listed in the DICOM Conformance Statement and the active Storage Server “Image Format” is set to “Automatic”, then “New Ultrasound” is the correct setting for “Store Image Format”.
- If the above is not true and at least one of US Image (Retired) is listed in the DICOM Conformance Statement, then “Old Ultrasound” is the correct setting for “Store Image Format”.
- If neither of the above are true, then “Secondary Capture” is the correct setting for “Store Image Format”.

7.2.2.5 DICOM Print Configuration

For each DICOM Print server, the following data is configurable by the user using the System Presets DICOM Print User Interface. The effect of changing parameters of the DICOM Print server will be seen at the next created film sheet. The current film sheet is not affected by changing these parameters.

Table 41: User-Configurable Printer Parameters

Parameter	Description
Printer Type	Color or Black and White - depends on printer
Film Size	Select the size of the film - 8x10 inches, 8.5x11 inches, 10x12 inches, 10x14 inches, 11x14 inches, 11x17 inches, 14x14 inches, 14x17 inches, 24x24 centimeters, 24x30 centimeters, A3, or A4.
Film Orientation	Select from Portrait: or Landscape:
Display Format	You must supply the number of rows and columns of images on the printed sheet. For example, a 6 on 1 print with Landscape mode should have 3 columns and 2 rows:  A 6 on 1 with Portrait mode would have 2 columns and 3 rows: 
Print Priority	HIGH, MEDIUM or LOW
Medium Type	PAPER, CLEAR FILM, BLUE FILM, TRANSPARENCY or CURRENT (to use the currently loaded media)
Film Destination	MAGAZINE, PROCESSOR or CURRENT
Max. Density	Used to define the Black value - printer specific
Min. Density	Used to define the White value - printer specific

Parameter	Description
Smoothing Type	Printer specific value
Border Density	BLACK or WHITE
Empty Image Density	BLACK or WHITE
Trim	YES/NO to having a border around each image
Polarity	Normal/reverse. Normal means black is printed as black. Reverse means the grayscale is inverted so that black comes out as white and white as black.
Magnification	Replicate, Bilinear, Cubic, None
Configuration Information	Printer Specific values

7.3 External Equipment Configuration

The ACUSON X150 user can configure “Hard Key” to “Output Device” mapping through the System Presets - Customize Keys. Print images are acquired and sent to the assigned device when the user presses the associated key. The following key assignments are supported:

- **Print/Store 1** – This key can be assigned to any configured DICOM Printer, DICOM Store or OEM printer device.
- **Print/Store 2** – This key can be assigned to any configured DICOM Printer, DICOM Store or OEM printer device.

7.4 Support of Extended Character Sets

The “ISO-IR 100” Latin Alphabet 1 Extended character set is supported by the ACUSON X150 system.

8.0 Security

8.1 Security Profiles

None supported.

8.2 Association Level Security

None supported.

8.3 Application Level Security

None supported.

8.4 Virus Protection

The ACUSON X150 computer system's networking has been configured to significantly reduce the possibility of virus and hacking vulnerabilities. On the X150 computer system, all ingress TCP and UDP ports are closed and/or absent of any type of server. The only exception to this is due to the necessity of a DICOM server available at ingress TCP port 104. Additionally, all non-essential computer services and components are disabled to minimize X150 egress network footprint.

Outside of some minimal network exchanges required by the X150's commercial computer operating system, the only network connections initiated by the X150 are for DICOM connectivity and network-share export function.

9.0 Appendix A: OB-GYN Structured Report Measurements

This appendix lists the DICOM Structured Report (SR) mappings used in the Obstetric and Gynecologic Structured Reports of X150 DICOM SR files.

The mappings are organized in a manner similar to the DICOM SR Templates as described in PS 3.16-2008 of the DICOM Standard. The "Label" column identifies the on-screen report label associated with a measurement. All private code values use the Coding Scheme Designator "99SIEMENS".

The OB-GYN Report mappings follow the DICOM SR Template TID 5000: OB-GYN Ultrasound Procedure Report, except where noted. Ovaries and Follicles are private sections in this release.

Notation:

< … > indicates that the description is not the actual text displayed
[…] is additional information

9.1 Patient Characteristics

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Patient Characteristics	Container: Patient Characteristics (DCM, 121118)		
AB	Aborta (LN, 11612-9)		
Ectopic	Ectopic Pregnancies (LN, 33065-4)		
Gravida	Gravida (LN, 11996-6)		
Height	Patient Height (LN, 8302-2)		
Para	Para (LN, 11977-6)		
Weight	Patient Weight (LN, 29463-7)		

9.2 OB-GYN Summary

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
OB-GYN Summary	Container: Summary (DCM, 121111)		
LMP	LMP (LN, 11955-2)		

9.3 Fetus Summary

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetus Summary	Container: Fetus Summary (DCM, 125008)		
Clinical MA	Gestational Age (LN, 18185-9)		
US MA, MA Based ON (AVERAGE)	Composite Ultrasound Age (LN, 11888-5)		
US MA, MA Based ON (<Author Label>)	Composite Ultrasound Age (LN, 11888-5)	<Composite Ultrasound Age Author Information>	
Estimated Fetal Weight: EFW1, <Author Label>, <value> <Gestational Age>	Estimated Weight (LN, 11727-5)	<EFW Author Information>	
	<Upper Value of Population Statistical Descriptor>		Estimated Weight (LN, 11727-5) <EFW Author Information>
	<Lower Value of Population Statistical Descriptor>		Estimated Weight (LN, 11727-5) <EFW Author Information>
	Gestational Age (LN, 18185-9)	<EFW Gestational Age Author Information>	
Estimated Fetal Weight: EFW2, <Author Label>, <value> <Gestational Age>	Estimated Weight (LN, 11727-5)	<EFW Author Information>	
	<Upper Value of Population Statistical Descriptor>		Estimated Weight (LN, 11727-5) <EFW Author Information>
	<Lower Value of Population Statistical Descriptor>		Estimated Weight (LN, 11727-5) <EFW Author Information>
	Gestational Age (LN, 18185-9)	<EFW Gestational Age Author Information>	
Williams EFW%: EFW1 Williams EFW%: EFW2	EFW percentile rank (LN, 11767-1)	Equation: FWP by GA, Williams, 1982 (LN, 33184-3)	
FHR	Fetal Heart Rate (LN, 11948-7)		
	Fetal Heart Rate (LN, 11948-7)	Derivation: Mean (SRT, R-00317)	

9.3.1 Composite Ultrasound Age Authors

Author Label	Composite Ultrasound Age Author Information	Comments
(Hadlock1) BPD, HC	Equation: Ultrasound MA Hadlock1 (99SIEMENS, USMAHadlock1)	
(Hadlock2) BPD, AC	Equation: Ultrasound MA Hadlock2 (99SIEMENS, USMAHadlock2)	
(Hadlock3) BPD, FL	Equation: Ultrasound MA Hadlock3 (99SIEMENS, USMAHadlock3)	
(Hadlock4) HC, AC	Equation: Ultrasound MA Hadlock4 (99SIEMENS, USMAHadlock4)	
(Hadlock5) HC, FL	Equation: Ultrasound MA Hadlock5 (99SIEMENS, USMAHadlock5)	

Author Label	Composite Ultrasound Age Author Information	Comments
(Hadlock6) AC, FL	Equation: Ultrasound MA Hadlock6 (99SIEMENS, USMAHadlock6)	
(Hadlock7) BPD, HC, AC	Equation: Ultrasound MA Hadlock7 (99SIEMENS, USMAHadlock7)	
(Hadlock8) BPD, HC, FL	Equation: Ultrasound MA Hadlock8 (99SIEMENS, USMAHadlock8)	
(Hadlock9) BPD, AC, FL	Equation: Ultrasound MA Hadlock9 (99SIEMENS, USMAHadlock9)	
(Hadlock10) HC, AC, FL	Equation: Ultrasound MA Hadlock10 (99SIEMENS, USMAHadlock10)	
(Hadlock11) BPD, HC, AC, FL	Equation: Ultrasound MA Hadlock11 (99SIEMENS, USMAHadlock11)	

9.3.2 EFW Authors

Author Label	EFW Author Information	Population Statistical Descriptors
HADLOCK1 (AC, FL)	Equation: EFW by AC, FL, Hadlock 1984 (LN, 11750-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
HADLOCK2 (BPD, AC, FL)	Equation: EFW by AC, BPD, FL, Hadlock 1985 (LN, 11735-8)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
HADLOCK3 (HC, AC, FL)	Equation: EFW by AC, FL, HC, Hadlock 1985 (LN, 11746-5)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
HADLOCK4 (BPD, HC, AC, FL)	Equation: EFW by AC, BPD, FL, HC, Hadlock 1985 (LN, 11732-5)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
HANSMANN (BPD, ATD)	Equation: EFW by BPD, TTD, Hansmann 1986 (LN, 33139-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JSUM (BPD, AC, FL)	Equation: EFW JSUM (99SIEMENS, EFWJSUM)	No Population Statistical Description
JSUM (AXT) (BPD, APTD, TTD, FL)	Equation: EFW JSUM AXT (99SIEMENS, EFWJSUMAXT)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
MERZ (BPD, AC)	Equation: EFW Merz (99SIEMENS, EFWMerz)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
OSAKA (BPD, FTA, FL)	Equation: EFW by BPD, FTA, FL, Osaka 1990 (LN, 33140-5)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
SHEPARD (BPD, AC)	Equation: EFW by AC and BPD, Shepard 1982 (LN, 11739-0)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
TOKYO (BPD, APTD, TTD, FL)	Equation: EFW by BPD, APAD, TAD, FL, Tokyo 1987 (LN, 33144-7)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.3.3 EFW Gestational Age Authors

Author Label	EFW Gestational Age Author Information	Population Statistical Descriptors
JSUM (BPD, AC, FL)	Equation: EFW1 MA JSUM (99SIEMENS, MAEFW1JSUM)	No Population Statistical Descriptors
JSUM (BPD, AC, FL)	Equation: EFW2 MA JSUM (99SIEMENS, MAEFW2JSUM)	No Population Statistical Descriptors

Author Label	EFW Gestational Age Author Information	Population Statistical Descriptors
OSAKA (BPD, FTA, FL)	Equation: EFW1 MA Osaka (99SIEMENS, MAEFW1Osaka)	No Population Statistical Descriptors
OSAKA (BPD, FTA, FL)	Equation: EFW2 MA Osaka (99SIEMENS, MAEFW2Osaka)	No Population Statistical Descriptors
TOKYO (BPD, APTD, TTD, FL)	Equation: EFW1 MA Tokyo (99SIEMENS, MAEFW1Tokyo)	No Population Statistical Descriptors
TOKYO (BPD, APTD, TTD, FL)	Equation: EFW2 MA Tokyo (99SIEMENS, MAEFW2Tokyo)	No Population Statistical Descriptors

9.4 Fetal Biometry Ratios

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Biometry Ratios	Container: Fetal Biometry Ratios (DCM, 125001)		
Measurement: CTAR	Cardiothoracic Area Ratio (99SIEMENS, CTAR)		
Measurement: A	CTAR Cardiac Area (99SIEMENS, CTAR_A)		
Measurement: B	CTAR Thoracic Area (99SIEMENS, CTAR_B)		
Ratio: CI, <Value> (<Lower Limit> – <Upper Limit>), CHITTY	Cephalic Index (LN, 11823-2)	Equation: CI Ratio Chitty (99SIEMENS, CIChitty)	
	Normal Range Upper Limit (SRT, R-0038B)		Cephalic Index (LN, 11823-2)
	Normal Range Lower Limit (SRT, R-10041)		Cephalic Index (LN, 11823-2)
Ratio: CI, <Value> (<Lower Limit> – <Upper Limit>), HADLOCK	Cephalic Index (LN, 11823-2)	Equation: CI Ratio Hadlock (99SIEMENS, CIHadlock)	
	Normal Range Upper Limit (SRT, R-0038B)		Cephalic Index (LN, 11823-2)
	Normal Range Lower Limit (SRT, R-10041)		Cephalic Index (LN, 11823-2)
Ratio: FL/AC, <Value> (<Lower Limit> – <Upper Limit>), HADLOCK	FL/AC (LN, 11871-1)	Equation: FL/AC Hadlock (99SIEMENS, FLACHadlock)	
	Normal Range Upper Limit (SRT, R-0038B)		FL/AC (LN, 11871-1)
	Normal Range Lower Limit (SRT, R-10041)		FL/AC (LN, 11871-1)
Ratio: FL/BPD, <Value> (<Lower Limit> – <Upper Limit>), HOHLER	FL/BPD (LN, 11872-9)	Equation: FL/BPD Hohler (99SIEMENS, FLBPDHohler)	
	Normal Range Upper Limit (SRT, R-0038B)		FL/BPD (LN, 11872-9)
	Normal Range Lower Limit (SRT, R-10041)		FL/BPD (LN, 11872-9)

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Ratio: HC/AC, <Value> (<Lower Limit> – <Upper Limit>), CAMPBELL	HC/AC (LN, 11947-9)	Equation: HC/AC Campbell (99SIEMENS, HCACCampbell)	
	Normal Range Upper Limit (SRT, R-0038B)		HC/AC (LN, 11947-9)
	Normal Range Lower Limit (SRT, R-10041)		HC/AC (LN, 11947-9)
Ratio: LVW/HW, <Value> (<Lower Limit> – <Upper Limit>), JOHNSON	LVW/HW (99SIEMENS, RatioLVWHW)	Equation: LVW/HW Johnson (99SIEMENS, LVWHWJohnson)	
	Normal Range Upper Limit (SRT, R-0038B)		LVW/HW (99SIEMENS, RatioLVWHW)
	Normal Range Lower Limit (SRT, R-10041)		LVW/HW (99SIEMENS, RatioLVWHW)
Ratio: TCD/AC, <Value> (<Lower Limit> – <Upper Limit>), MEYER	TCD/AC (99SIEMENS, RatioTCDAC)	Equation: TCD/AC Meyer (99SIEMENS, TCDACMeyer)	
	Normal Range Upper Limit (SRT, R-0038B)		TCD/AC (99SIEMENS, RatioTCDAC)
	Normal Range Lower Limit (SRT, R-10041)		TCD/AC (99SIEMENS, RatioTCDAC)

9.5 Fetal Biometry Measurements

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Biometry Measurements	Container: Fetal Biometry (DCM, 125002)		
Measurement: AC, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Abdominal Circumference (LN, 11979-2)		
	Abdominal Circumference (LN, 11979-2)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<AC Gestational Age Author Information>	Abdominal Circumference (LN, 11979-2)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Abdominal Circumference (LN, 11979-2) <AC Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Abdominal Circumference (LN, 11979-2) <AC Gestational Age Author Information>

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Measurement: APTD, <Value>	Anterior-Posterior Trunk Diameter (LN, 11819-0)		
	Anterior-Posterior Trunk Diameter (LN, 11819-0)	Derivation: Mean (SRT, R-00317)	
Measurement: ASD, <Author Label>, <Gestational Age>, <Value>	Anterior-Posterior Abdominal Diameter (LN, 11818-2)		
	Anterior-Posterior Abdominal Diameter (LN, 11818-2)	Derivation: Mean (SRT, R-00317)	
<Author Label>: MERZ	Gestational Age (LN, 18185-9)	Equation: ASD MA Merz (99SIEMENS, ASDMAMerz)	Anterior-Posterior Abdominal Diameter (LN, 11818-2)
Measurement: ATD, <Author Label>, <Gestational Age>, <Value>	Transverse Abdominal Diameter (LN, 11862-0)		
	Transverse Abdominal Diameter (LN, 11862-0)	Derivation: Mean (SRT, R-00317)	
<Author Label>: MERZ	Gestational Age (LN, 18185-9)	Equation: ATD MA Merz (99SIEMENS, ATDMAMerz)	Transverse Abdominal Diameter (LN, 11862-0)
Measurement: AXT, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	APAD * TAD (LN, 33191-8)		
<Author Label>: TOKYO	Gestational Age (LN, 18185-9)	Equation: AXT MA Tokyo (99SIEMENS, MAAXTTokyo)	APAD * TAD (LN, 33191-8)
	1 Sigma Upper Value of population (SRT, R-00346)		Gestational Age (LN, 18185-9) APAD * TAD (LN, 33191-8) Equation: AXT MA Tokyo (99SIEMENS, MAAXTTokyo)
	1 Sigma Lower Value of population (SRT, R-00347)		Gestational Age (LN, 18185-9) APAD * TAD (LN, 33191-8) Equation: AXT MA Tokyo (99SIEMENS, MAAXTTokyo)

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Measurement: BPD, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Biparietal Diameter (LN, 11820-8)		
	Biparietal Diameter (LN, 11820-8)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<BPD Gestational Age Author Information>	Biparietal Diameter (LN, 11820-8)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Biparietal Diameter (LN, 11820-8) <BPD Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Biparietal Diameter (LN, 11820-8) <BPD Gestational Age Author Information>
Measurement: CorBPD, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	BPD area corrected (LN, 11824-0)		
<Author Label>: USMA	Gestational Age (LN, 18185-9)	Equation: CorBPD MA (99SIEMENS, UsmaCorBPD)	BPD area corrected (LN, 11824-0)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) BPD area corrected (LN, 11824-0) Equation: CorBPD MA (99SIEMENS, UsmaCorBPD)
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) BPD area corrected (LN, 11824-0) Equation: CorBPD MA (99SIEMENS, UsmaCorBPD)
Measurement: Facial Angle, <Value>	Facial Angle (99SIEMENS, FacialAngle)		
	Facial Angle (99SIEMENS, FacialAngle)	Derivation: Mean (SRT, R-00317)	
Measurement: FT, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>,<Value>	Foot length (LN, 11965-1)		
	Foot length (LN, 11965-1)	Derivation: Mean (SRT, R-00317)	

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
<Author Label>: MERCER	Gestational Age (LN, 18185-9)	Equation: Foot Length, Mercer 1987 (LN, 11926-3)	Foot Length (LN, 11965-1)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Foot Length (LN, 11965-1) Equation: Foot Length, Mercer 1987 (LN, 11926-3)
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Foot Length (LN, 11965-1) Equation: Foot Length, Mercer 1987 (LN, 11926-3)
Measurement: FTA, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Thoracic Area (LN, 33068-8)		
	Thoracic Area (LN, 33068-8)	Derivation: Mean (SRT, R-00317)	
<Author Label>: OSAKA	Gestational Age (LN, 18185-9)	Equation: FTA MA Osaka (99SIEMENS, FTAMAOsaka)	Thoracic Area (LN, 33068-8)
Measurement: HC, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Head Circumference (LN, 11984-2)		
	Head Circumference (LN, 11984-2)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<HC Gestational Age Author Information>	Head Circumference (LN, 11984-2)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Head Circumference (LN, 11984-2) <HC Gestational Age Author Information>
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Head Circumference (LN, 11984-2) <HC Gestational Age Author Information>
Measurement: OFD, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Occipital-Frontal Diameter (LN, 11851-3)		
	Occipital-Frontal Diameter (LN, 11851-3)	Derivation: Mean (SRT, R-00317)	
<Author Label>: ASUM	Gestational Age (LN, 18185-9)	Equation: OFD, ASUM 2000 (LN, 33119-9)	Occipital-Frontal Diameter (LN, 11851-3)
<Author Label>: MERZ	Gestational Age (LN, 18185-9)	Equation: OFD MA Merz (99SIEMENS, OFDMAMerz)	Occipital-Frontal Diameter (LN, 11851-3)

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Measurement: TC, <Value>	Thoracic Circumference (LN, 11988-3)		
	Thoracic Circumference (LN, 11988-3)	Derivation: Mean (SRT, R-00317)	
Measurement: TCD, <Value>	Trans Cerebellar Diameter (LN, 11863-8)		
	Trans Cerebellar Diameter (LN, 11863-8)	Derivation: Mean (SRT, R-00317)	
Measurement: TTD, <Value>	Transverse Thoracic Diameter (LN, 11864-6)		
	Transverse Thoracic Diameter (LN, 11864-6)	Derivation: Mean (SRT, R-00317)	
Measurement: Left RAP, <Value>	Left Kidney thickness (LN, 11853-9)		
	Left Kidney thickness (LN, 11853-9)	Derivation: Mean (SRT, R-00317)	
Measurement: Left RL, <Value>	Left Kidney length (LN, 11834-9)		
	Left Kidney length (LN, 11834-9)	Derivation: Mean (SRT, R-00317)	
Measurement: Right RAP, <Value>	Right Kidney thickness (LN, 11855-4)		
	Right Kidney thickness (LN, 11855-4)	Derivation: Mean (SRT, R-00317)	
Measurement: Right RL, <Value>	Right Kidney length (LN, 11836-4)		
	Right Kidney length (LN, 11836-4)	Derivation: Mean (SRT, R-00317)	

9.5.1 AC Gestational Age Authors

Author Label	AC Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: AC, ASUM 2000 (LN, 33072-0)	No Population Statistical Descriptors
HADLOCK	Equation: AC, Hadlock 1984 (LN, 11892-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JSUM	Equation: AC MA JSUM (99SIEMENS, ACMAJSUM)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
LASSER	Equation: AC MA Lasser (99SIEMENS, ACMALasser)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
MERZ	Equation: AC, Mertz 1988 (LN, 33075-3)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)

9.5.2 BPD Gestational Age Authors

Author Label	BPD Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: BPD, ASUM 1989 (LN, 33079-5)	No Population Statistical Descriptors
HADLOCK	Equation: BPD, Hadlock 1984 (LN, 11902-4)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JSUM	Equation: BPD MA JSUM (99SIEMENS, BPDMAJSUM)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
LASSER	Equation: BPD MA Lasser (99SIEMENS, BPDMALasser)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
MERZ	Equation: BPD, Mertz 1988 (LN, 33081-1)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
OSAKA	Equation: BPD, Osaka 1989 (LN, 33082-9)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
REMPEN	Equation: BPD, Rempen 1991 (LN, 33083-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
TOKYO	Equation: BPD, Tokyo 1986 (LN, 33085-2)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.5.3 HC Gestational Age Authors

Author Label	HC Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: HC, ASUM 2000 (LN, 33109-0)	No Population Statistical Descriptors
HADLOCK	Equation: HC, Hadlock 1984 (LN, 11932-1)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
LASSER	Equation: HC MA Lasser (99SIEMENS, HCMALasser)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
MERZ	Equation: HC, Merz 1988 (LN, 33115-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)

9.6 Fetal Long Bones Biometry Measurements

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Long Bones Biometry	Container: Fetal Long Bones (DCM, 125003)		
Measurement: CL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Clavicle length (LN, 11962-8)		

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
	Clavicle length (LN, 11962-8)	Derivation: Mean (SRT, R-00317)	
<Author Label>: YARKONI	Gestational Age (LN, 18185-9)	Equation: Clavicle length, Yarkoni 1985 (LN, 33088-6)	Clavicle length (LN, 11962-8)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Clavicle length (LN, 11962-8) Equation: Clavical length, Yarkoni 1985 (LN, 33088-6)
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Clavicle length (LN, 11962-8) Equation: Clavical length, Yarkoni 1985 (LN, 33088-6)
Measurement: FL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Femur Length (LN, 11963-6)		
	Femur Length (LN, 11963-6)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<FL Gestational Age Author Information>	Femur Length (LN, 11963-6)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Femur Length (LN, 11963-6) <FL Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Femur Length (LN, 11963-6) <FL Gestational Age Author Information>
Measurement: HL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Humerus length (LN, 11966-9)		
	Humerus length (LN, 11966-9)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<HL Gestational Age Author Information>	Humerus length (LN, 11966-9)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Humerus length (LN, 11966-9) <HL Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Humerus length (LN, 11966-9) <HL Gestational Age Author Information>
Measurement: TL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Tibia Length (LN, 11968-5)		

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
	Tibia Length (LN, 11968-5)	Derivation: Mean (SRT, R-00317)	
<Author Label>: JEANTY	Gestational Age (LN, 18185-9)	Equation: Tibia, Jeanty 1984 (LN, 11941-2)	Tibia Length (LN, 11968-5)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Tibia Length (LN, 11968-5) Equation: Tibia, Jeanty 1984 (LN, 11941-2)
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Tibia Length (LN, 11968-5) Equation: Tibia, Jeanty 1984 (LN, 11941-2)
Measurement: UL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Ulna Length (LN, 11969-3)		
	Ulna Length (LN, 11969-3)	Derivation: Mean (SRT, R-00317)	
<Author Label>: JEANTY	Gestational Age (LN, 18185-9)	Equation: Ulna, Jeanty 1984 (LN, 11944-6)	Ulna Length (LN, 11969-3)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Ulna Length (LN, 11969-3) Equation: Ulna, Jeanty 1984 (LN, 11944-6)
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Ulna Length (LN, 11969-3) Equation: Ulna, Jeanty 1984 (LN, 11944-6)

9.6.1 FL Gestational Age Authors

Author Label	FL Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: FL, ASUM 2000 (99SIEMENS, FLMAASUM)	No Population Statistical Descriptors
HADLOCK	Equation: FL, Hadlock 1984 (LN, 11920-6)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JEANTY	Equation: FL, Jeanty 1984 (LN, 11923-0)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JSUM	Equation: FL MA JSUM (99SIEMENS, FLMAJSUM)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
MERZ	Equation: FL, Merz 1988 (LN, 33542-2)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)

Author Label	FL Gestational Age Author Information	Population Statistical Descriptors
OSAKA	Equation: FL, Osaka 1989 (LN, 33101-7)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
TOKYO	Equation: FL, Tokyo 1986 (LN, 33103-3)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.6.2 HL Gestational Age Authors

Author Label	FL Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: Humerus Length, ASUM 2000 (LN, 33116-5))	No Population Statistical Descriptors
JEANTY	Equation: Humerus, Jeanty 1984 (LN, 11936-2)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
OSAKA	Equation: Humerus Length, Osaka 1989 (LN, 33117-3)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.7 Fetal Cranium

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Cranium	Container: Fetal Cranium (DCM, 125004)		
Measurement: BN, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Outer Orbital Diameter (LN, 11629-3)		
	Outer Orbital Diameter (LN, 11629-3)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<BN Gestational Age Author Information>	Outer Orbital Diameter (LN, 11629-3)
	2 Sigma Upper Value of population (SRT, R-00387)		Gestational Age (LN, 18185-9) Outer Orbital Diameter (LN, 11629-3) <BN Gestational Age Author Information>
	2 Sigma Lower Value of population (SRT, R-00388)		Gestational Age (LN, 18185-9) Outer Orbital Diameter (LN, 11629-3) <BN Gestational Age Author Information>
Measurement: Cist Magna, <Value>	Cisterna Magna (LN, 11860-4)		
	Cisterna Magna (LN, 11860-4)	Derivation: Mean (SRT, R-00317)	
Measurement: HW, <Value>	Width of Hemisphere (LN, 12170-7)		
	Width of Hemisphere (LN, 12170-7)	Derivation: Mean (SRT, R-00317)	
Measurement: LVW, <Value>	Lateral Ventrical width (LN, 12171-5)		
	Lateral Ventrical width (LN, 12171-5)	Derivation: Mean (SRT, R-00317)	

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Measurement: NT, <Value>	Nuchal Fold Thickness (LN, 12146-7)		
	Nuchal Fold Thickness (LN, 12146-7)	Derivation: Mean (SRT, R-00317)	

9.7.1 BN Gestational Age Authors

Author Label	BN Gestational Age Author Information	Population Statistical Descriptors
JEANTY	Equation: BN MA Jeanty (99SIEMENS, BNMAJeanty)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
TONGSONG	Equation: BN MA Tongsong (99SIEMENS, BNMATongsong)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)

9.8 Amniotic Sac

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Amniotic Sac	Finding Site: Amniotic Sac (SRT, T-F1300)		
Measurement: AFI	Amniotic Fluid Index (LN, 11627-7)		
Measurement: Q1	First Quadrant Diameter (LN, 11624-4)		
	First Quadrant Diameter (LN, 11624-4)	Derivation: Mean (SRT, R-00317)	
Measurement: Q2	Second Quadrant Diameter (LN, 11626-9)		
	Second Quadrant Diameter (LN, 11626-9)	Derivation: Mean (SRT, R-00317)	
Measurement: Q3	Third Quadrant Diameter (LN, 11625-1)		
	Third Quadrant Diameter (LN, 11625-1)	Derivation: Mean (SRT, R-00317)	
Measurement: Q4	Fourth Quadrant Diameter (LN, 11623-6)		
	Fourth Quadrant Diameter (LN, 11623-6)	Derivation: Mean (SRT, R-00317)	

9.9 Early Gestation Biometry Measurements

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Early Gestation Biometry Measurements	Container: Early Gestation (DCM, 125009)		
Early OB: CRL, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Crown Rump Length (LN, 11957-8)		

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
	Crown Rump Length (LN, 11957-8)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<CRL Author Information>	Crown Rump Length (LN, 11957-8)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Crown Rump Length (LN, 11957-8) <CRL Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Crown Rump Length (LN, 11957-8) <CRL Gestational Age Author Information>
Early OB: GS, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, < Value> or Measurement: MSD, <Author Label>, <Gestational Age> ±<Population Statistical Descriptor>, <Value>	Gestational Sac Diameter (LN, 11850-5)		
	Gestational Sac Diameter (LN, 11850-5)	Derivation: Mean (SRT, R-00317)	
	Gestational Age (LN, 18185-9)	<GS or MSD Author Information>	Gestational Sac Diameter (LN, 11850-5)
	<Upper Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Gestational Sac Diameter (LN, 11850-5) <GS or MSD Gestational Age Author Information>
	<Lower Value of Population Statistical Descriptor>		Gestational Age (LN, 18185-9) Gestational Sac Diameter (LN, 11850-5) <GS or MSD Gestational Age Author Information>
Measurement: Yolk Sac	Yolk Sac length (LN, 11816-6)		
	Yolk Sac length (LN, 11816-6)	Derivation: Mean (SRT, R-00317)	

9.9.1 CRL Gestational Age Authors

Author Label	CRL Gestational Age Author Information	Population Statistical Descriptors
ASUM	Equation: CRL, ASUM 2000 (LN, 33090-2)	No Population Statistical Descriptors
HADLOCK	Equation: CRL, Hadlock 1992 (LN, 11910-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
HANSMANN	Equation: CRL, Hansmann 1986 (LN, 33540-6)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
JSUM	Equation: CRL MA JSUM (99SIEMENS, CRLMAJSUM)	No Population Statistical Descriptors

Author Label	CRL Gestational Age Author Information	Population Statistical Descriptors
LASSER	Equation: CRL MA Lasser (99SIEMENS, CRLMALasser)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
OSAKA	Equation: CRL, Osaka 1989 (LN, 33093-6)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
ROBINSON	Equation: CRL, Robinson 1975 (LN, 11914-9)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)
TOKYO	Equation: CRL, Tokyo 1986 (LN, 33096-9)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.9.2 GS Gestational Age Authors

Author Label	CRL Gestational Age Author Information	Population Statistical Descriptors
OSAKA	Equation: GS MA Osaka (99SIEMENS, GSMAOsaka)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)
TOKYO	Equation: GS, Tokyo 1986 (LN, 33108-2)	1 Sigma Upper Value of population (SRT, R-00346) 1 Sigma Lower Value of population (SRT, R-00347)

9.9.3 MSD Gestational Age Authors

Author Label	CRL Gestational Age Author Information	Population Statistical Descriptors
HELLMAN	Equation: GS, Hellman 1969 (LN, 11928-9)	No Population Statistical Descriptors
REMPEN	Equation: GS, Rempen 1991 (LN, 11929-7)	2 Sigma Upper Value of population (SRT, R-00387) 2 Sigma Lower Value of population (SRT, R-00388)

9.10 Fetal Biophysical Profile

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Biophysical Profile	Container: Biophysical Profile (DCM, 125006)		
AFV	Amniotic Fluid Volume (LN, 11630-1)		
Breathing	Fetal Breathing (LN, 11632-7)		
Movement	Gross Body Movement (LN, 11631-9)		
Tone	Fetal Tone (LN, 11635-0)		

9.11 Pelvis and Uterus

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Pelvis and Uterus	Container: Pelvis and Uterus (DCM, 125011)		
2D Mode: Cervix or Cervix Len	Cervix Length (LN, 11961-0)		
	Cervix Length (LN, 11961-0)	Derivation: Mean (SRT, R-00317)	
2D Mode: Endometrium	Endometrium Thickness (LN, 12145-9)		
2D Mode: Uterus	Container: Uterus (SRT, T-83000)		
Length	Uterus Length (LN, 11842-2)		
Width	Uterus Width (LN, 11865-3)		
Depth	Uterus Height (LN, 11859-6)		

9.12 Pelvic Vasculature

Heading: Vessel Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Pelvic Vasculature	Finding Site: Pelvic Vascular Structure (SRT, T-D6007)		
Doppler Mode: Left Ovarian Artery	Location: Ovarian Artery (SRT, T-46980)	Laterality: Left (SRT, G-A101)	
Systole	Peak Systolic Velocity (LN, 11726-7)		
Diastole	End Diastolic Velocity (LN, 11653-3)		
S/D	Systolic to Diastolic Velocity Ratio (LN, 12144-2)		
RI	Resistivity Index (LN, 12023-8)		
PI	Pulsatility Index (LN, 12008-9)		
Doppler Mode: Right Ovarian Artery	Location: Ovarian Artery (SRT, T-46980)	Laterality: Right (SRT, G-A100)	
Systole	Peak Systolic Velocity (LN, 11726-7)		
Diastole	End Diastolic Velocity (LN, 11653-3)		
S/D	Systolic to Diastolic Velocity Ratio (LN, 12144-2)		
RI	Resistivity Index (LN, 12023-8)		
PI	Pulsatility Index (LN, 12008-9)		
Doppler Mode: Uterine Artery	Location: Uterine Artery (SRT, T-46820)		
Systole	Peak Systolic Velocity (LN, 11726-7)		
Diastole	End Diastolic Velocity (LN, 11653-3)		

Heading: Vessel Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
S/D	Systolic to Diastolic Velocity Ratio (LN, 12144-2)		
RI	Resistivity Index (LN, 12023-8)		
PI	Pulsatility Index (LN, 12008-9)		
Doppler Mode: Umb A	Location: Umbilical Artery (SRT, T-F1810)		
Systole	Peak Systolic Velocity (LN, 11726-7)		
	Peak Systolic Velocity (LN, 11726-7)	Derivation: Mean (SRT, R-00317)	
Diastole	End Diastolic Velocity (LN, 11653-3)		
	End Diastolic Velocity (LN, 11653-3)	Derivation: Mean (SRT, R-00317)	
S/D	Systolic to Diastolic Velocity Ratio (LN, 12144-2)		
	Systolic to Diastolic Velocity Ratio (LN, 12144-2)	Derivation: Mean (SRT, R-00317)	
RI	Resistivity Index (LN, 12023-8)		
	Resistivity Index (LN, 12023-8)	Derivation: Mean (SRT, R-00317)	
PI	Pulsatility Index (LN, 12008-9)		
	Pulsatility Index (LN, 12008-9)	Derivation: Mean (SRT, R-00317)	
Measurement: Umb VD	Location: Umbilical Vein (SRT, T-F1820)		
	Vessel lumen diameter (SRT, G-0364)		
	Vessel lumen diameter (SRT, G-0364)	Derivation: Mean (SRT, R-00317)	

9.13 Fetal Vasculature

Heading: Vessel Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Fetal Vasculature	Finding Site: Embryonic Vascular Structure (SRT, T-F6800)		
Doppler: MCA	Location: Middle Cerebral Artery (SRT, T-45600)		
Systole	Peak Systolic Velocity (LN, 11726-7)		
	Peak Systolic Velocity (LN, 11726-7)	Derivation: Mean (SRT, R-00317)	
Diastole	End Diastolic Velocity (LN, 11653-3)		
	End Diastolic Velocity (LN, 11653-3)	Derivation: Mean (SRT, R-00317)	
S/D	Systolic to Diastolic Velocity Ratio (LN, 12144-2)		

Heading: Vessel Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
	Systolic to Diastolic Velocity Ratio (LN, 12144-2)	Derivation: Mean (SRT, R-00317)	
RI	Resistivity Index (LN, 12023-8)		
	Resistivity Index (LN, 12023-8)	Derivation: Mean (SRT, R-00317)	
PI	Pulsatility Index (LN, 12008-9)		
	Pulsatility Index (LN, 12008-9)	Derivation: Mean (SRT, R-00317)	

9.14 Private Section: Ovaries

Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Ovaries	Container: Ovaries Section (99SIEMENS, Ovaries)		
2D-Mode: Lt Ovary, Width	Left Ovary Width (LN, 11829-9)		
2D-Mode: Lt Ovary, Length	Left Ovary Length (LN, 11840-6)		
2D-Mode: Lt Ovary, Depth	Left Ovary Height (LN, 11857-0)		
2D-Mode: Lt Ovary, Volume	Left Ovary Volume (LN, 12164-0)		
2D-Mode: Rt Ovary, Width	Right Ovary Width (LN, 11830-7)		
2D-Mode: Rt Ovary, Length	Right Ovary Length (LN, 11841-4)		
2D-Mode: Rt Ovary, Depth	Right Ovary Height (LN, 11858-8)		
2D-Mode: Rt Ovary, Volume	Right Ovary Volume (LN, 12165-7)		

9.15 Private Sections: Left and Right Follicles

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
Follicles <n> = 1 to 15	Container: Follicles Section (99SIEMENS, Follicles)	Laterality: Left (SRT, G-A101) or Laterality: Right (SRT, G-A100)	
Follicle Measurement, <Lt or Rt> Follicle: #<n>	Container: Follicle <n> (99SIEMENS, Follicle<n>)		
	Follicle Area (99SIEMENS, FollicleArea)		
	Follicle Circumference (99SIEMENS, FollicleCircum)		
	Follicle Diameter (LN, 11793-7)		
	Volume (SRT, G-D705)		

Heading: Measurement Label	Code Meaning (Coding Scheme Designator, Code Value)	Modifiers	Measurement References
	Follicle Diameter2 Mean (99SIEMENS, FollicleDiam2Mn)	Derivation: Mean (SRT, R-00317)	
	Follicle Diameter3 Mean (99SIEMENS, FollicleDiam3Mn)	Derivation: Mean (SRT, R-00317)	
	Container: 2 Follicle Diameters (99SIEMENS, Follicle2Diam)		
[2 values on report]	Follicle Diameter (LN, 11793-7)		
Avg.	Follicle Diameter (LN, 11793-7)	Derivation: Mean (SRT, R-00317)	
	Container: 3 Follicle Diameters (99SIEMENS, Follicle3Diam)		
[3 values on report]	Follicle Diameter (LN, 11793-7)		
Avg.	Follicle Diameter (LN, 11793-7)	Derivation: Mean (SRT, R-00317)	